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ANALYSIS OF ENTREPRENEURIAL COMPETENCIES OF PH.D. STUDENTS OF UNIVERSITY OF VAASA

Master's Thesis in
Industrial Management

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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ABSTRACT:

Entrepreneurship is on the rise throughout the world. Countries that are progressive perceive entrepreneurship as a vital part for their future development and economic competitiveness. PhD students possess values not only applicable in the academic environment but also in the business environment. Future training objectives of University of Vaasa for PhD students includes the focus on entrepreneurship. The purpose of this thesis is to analyze the level of competencies of PhD students in entrepreneurship field by using a self-assessment soft computing method. A sample group of 26 PhD students of University of Vaasa are chosen and participated to this study. Tricuspoid 2.0 of Evolute system is used to collect data. This tool collects the current state and future state of the respondents and presents creative tension for entrepreneurial competencies. In addition, this thesis analyses self-assessment results and presents a comparative research by comparing the results with a previous study at University of Girona BSc students. First research question investigates the theoretical background of the study and defines the main terms. Second research question focuses on assessment of the current state, future state and creative tension. Third research question focuses on a comparison of the results of University of Vaasa and University of Girona. Fourth research question focuses on an interpretation of results and offering recommendations for University of Vaasa management. An interview was conducted as an additional empirical data. This study clarified the competencies of University of Vaasa PhD students in entrepreneurship by enlightening which competencies they desire to improve. Results of this study also provides competencies to be focused on that provide insight for University of Vaasa management with future plans regarding their PhD programmes.

Keywords: entrepreneurial competencies, entrepreneurship, self-assessment, Evolute, creative tension.

1. INTRODUCTION

This chapter is about background of this master's thesis. In this chapter motivation for the study is described and background information is provided. Additionally, research questions, objectives and limitations of the study are presented in this chapter.

1.1. Motivation and Background

Entrepreneurship is gaining importance worldwide and attract individuals with different backgrounds for a variety of reasons that include job markets are becoming more competitive and causing university students and recent graduates to look for areas where they can utilize their skills and create value and earn their livelihood. Entrepreneurship has become well-recognized as a driver of financial prosperity, and a high number of governments around the world are highly supporting the development of entrepreneurship degree programs globally (Gedeon 2017).

Recent graduates, PhD students and MSc students are groups of people that possess a high potential for becoming entrepreneurs which is worth being explored. By having broad knowledge and expertise in their field, PhD students could be seen as entrepreneur candidates. This is the main motivation of the author to conduct this study.

University of Vaasa, School of Technology and Innovations focuses on both technological and social aspect in their Industrial Management programme and offers a Master of Science in Economics and Business Administration degree which differentiates it from a pure engineering focused programme. This gives the graduates the opportunity to gain social and technical skills required in competitive business environments such as the entrepreneurial environment of today. University of Vaasa Industrial Management programme focuses on social and communication aspects which also targets of

developing both oral and written communication capabilites of its students. Both of oral and written communication skills, in addition to technical and engineering skills, are considered important when it comes to entrepreneurial success.

University of Vaasa Industrial Management programme students are aimed to gain the following skills during their studies as learning outcomes (University of Vaasa 2019):

apply their knowledge of industrial management either in the area of technology management and product development or in the area of production management and logistics

- lead technology development so that the company can be profitable and the employees are involved in the change process
- work in production management, product development, risk management and other tasks that combine business and technological knowledge
- apply in their work both logical thinking as well as finding and presenting the core knowledge in different situations
- apply scientific thinking in reporting research and has good written presentation skills
- carry on their studies in doctoral level
- apply research methods in industrial management
- utilize and further develop their knowledge in improving the processes of a company

Industrial management master's degree program develops the abilities of their students in the field of duties requiring high level business and technological expertise. It prepares students to work in high-tech companies, research centers and universities which utilize rapidly changing technologies. (University of Vaasa 2019).

University of Vaasa Industrial Management programme doctoral students develop valuable skills during their education with a focus on energy, finance and management.

In addition to gaining academic capabilities to conduct research, doctoral students learn about work-oriented applied research that involves applying known methods and tools while developing new solutions for problems related to the field of technology and economy.

These valuable skills make them possess many of the required capabilities in entrepreneurship field as well. This constitutes a starting point for this research study.

In order to explore the entrepreneurial capacity and capabilities of the students in entrepreneurship, various methods can be used. One of them is self-assessment. Self-assessment focuses on the evaluation of the self. There are tools available that provide guidance for self-assessment and facilitate this process to be performed in a structured way. The self-assessment emethod we will use in this study is Evolute system. According to Evolute.fi (2019) *the Evolute system allows for discovering and managing the organizational sense of identity and purpose that exists inside each corporation and among the stakeholders*. With the help of Evolute system, it is also possible to assess the organizational sense of purpose exhibited by the employees. The visualized organizational sense is useful for targeted management and leadership of corporate resources, saving time, money and resources, according to a modular process. Additionally, Evolute system provides targeted resource development for industries. (Evolute.fi 2019).

A development group in University of Vaasa management has been considering making changes to the curriculum of first year doctoral students of University of Vaasa in near future. Although it has not yet been decided or revelaed the exact scope of this effort, it is being considered to combine basic courses for different doctoral departments into single courses which then will be offered to doctoral students from all departments. Courses that are deemed as important to the entire group of doctoral students are planned to be offered as one course to the entire group. Author suggests that entrepreneurship course or courses that teach related skills have a potential to be one of the courses offered to doctoral students.

In order to obtain a clear picture it is worth to explore and measure capabilities of PhD

students in entrepreneurship of University of Vaasa. This can facilitate future opportunity windows to be discovered for both the students and the University of Vaasa as an organisation.

1.2. Research Questions and Objectives of the Study

The research area of this thesis is entrepreneurial competencies. This research will examine competencies of PhD students in entrepreneurship by using a self-evaluation method, Evolute system. The purpose of this thesis is to explore the current level of competencies of the sample groups and present an analysis for the desire for improvement in these competencies by using a self-evaluation method.

Tricuspoid 2.0 is a tool of Evolute that defines a list of competencies to measure the entrepreneurial competencies. These are conceptual thinking, metacognitive skills, conflict management, self-capacity (capability), flexibility, service orientation, change management, self-assessment, adventurism, optimism, decision-making skills, analytical thinking, understanding others, production efficiency, self-confidence, leadership, developing others, professional and technical knowledge, seizing opportunities, management, strategic thinking, collaboration, emotional awareness, seeking information, creativeness, problem-solving skills, stress tolerance, innovativeness, initiative, acknowledging own values, achievement orientation, trustworthiness, flow. These are the competencies that sample groups will be assessed for.

The main objective of this study is to analyze competencies of the sample group for entrepreneurship and examine the level of creative tension of them that will facilitate them to reach the desired level of these competencies. According to the empirical research and and responses to questions, current state, future state and creative tension of the respondents in entrepreneurship will be determined by the output of Tricuspoid 2.0.

Research questions for this study are the following:

RQ1) What is a competence model and what are the competencies for entrepreneurship?

In order to address this question a theoretical research will be done on entrepreneurship, competence models and entrepreneurial competencies and then will be presented in the relevant chapters.

RQ2) What is the state of competencies of PhD students of University of Vaasa for entrepreneurship in terms of current state, aimed future state and creative tension?

In order to address this question by using the Evolute's Tricuspoid 2.0 tool data will be collected. Later the results will be analized in detail and current level, target level and creative tension of PhD students of University of Vaasa (Case 1) will be presented.

RQ3) How does the state of the entrepreneurial competencies of University of Vaasa PhD students compare to a previous study at Girona University?

In order to address this question after the analysis of Case 1 it will be compared with the results of BSc students of University of Girona (Case 2).

RQ4) How are the results interpreted and what are the recommendations?

Meaning of the results will be interpreted by the author and presented. Interview with the Vice Dean of University of Vaasa and the information gathered from it will be considered as well while interpreting the results from Evolute. Recommendations based on Evolute and the interview will be done.

The above-mentioned research questions will be answered under relevant titles in the coming chapters of this thesis.

1.3. Scope and Limitations

This study aims to identify the state of the entrepreneurial competencies by the usage of

a self-evaluation system, Evolute. During this study it is assumed that the model that the data collection tool offers a reliable representation of the state of entrepreneurial competencies of the respondents by using a competence model.

Due to the research method being based on self-evaluation, collected data will be affected directly by the responses of the respondents and may be subject to personal bias from the participants. According to Goleman (1998) accurate self-assessment requires knowing one's inner resources, abilities, and limits. He further elaborates that people who possess self-assessment skill know their strengths and weaknesses, learn from experience, welcome sincere feedback, new insights, lifelong learning and self-development and capable of showing a sense of humor and perspective.

In this thesis respondents are asked to choose their current level, target level, and importance for them of each statement. Respondents performing the self-assessment are

seen as best evaluators of their own self. Therefore accuracy of the data collection will depend on the accuracy of responses of the participants.

1.4. Structure of the Research

This master's thesis is divided into seven chapters. Chapter one introduces the study and provides background information for the study. In the first chapter background information is provided, motivation for the study is described and research questions are presented. Additionally, in chapter one scope and limitations of the study are presented.

Chapter two provides the theoretical framework that this thesis will be based on. It defines competence model and the competencies of entrepreneurs that will be assessed in this study. Competencies of entrepreneurs in the Evolute tool Tricuspoid 2.0 are defined in detail in this chapter as well.

In chapter three research methodology and research design is presented. In addition

chapter three describes the data collection analysis methods in detail and provides information on Evolute system.

Chapter four presents the results of this study. In this chapter results are provided for Case 1 and Case 2 firstly at group level, then competence group level and finally competence main group level. Additional information on data collection process and interview results are also presented in this chapter.

Chapter five provides discussion on results and interpret the results more deeply. Results are discussed with a focus on University of Vaasa group. Additionally interesting observations, similarities and differences between cases are mentioned. In this chapter recommendation for improvement of competencies for University of Vaasa management is also presented.

In chapter six theoretical and practical implications of this study are presented.

Chapter seven presents the conclusions. In this chapter conclusions of this study are presented by linking them to research questions. This chapters ends with recommendations for future studies.

1.5. Research approach

Case study method is used in this study. Empirical data was collected using a self-assessment tool, Evolute. Two groups of empirical data from two participant groups are compared and analysed. These will be referred as Case 1 and Case 2 in further paragraphs.

Case 1 is PhD students of University of Vaasa, Finland and Case 2 is BSc students of University of Girona, Spain. Comparative research method is used to analyze the results of these two groups. Comparative research is about comparing two or more things with the aim of discovering about these things compared. Comparative research often utilized multiple disciplines. Methodology of comparative research is similar to daily practice of

comparison of things. Similarities and differences of cases are explored. Conclusions are made upon the extent of these similarities and differences.

There is no a single methodology specific to comparative research (Heidenheimer, Heclo & Adams 1983). Both of qualitative and quantitative analysis can be used in comparative research. It is seen that quantitative analysis is pursued more often than qualitative in the comparative research in literature. (Deutsch 1987; Deacon 1983; Esping-Andersen 1990).

2. THEORETICAL FRAMEWORK

2.1. Entrepreneurship

Entrepreneurship is the foundation of an organization in which economic factors are transformed in order to create value by bringing together the factors of production for the purpose of creating economic goods or services. Differing from a regular business activity entrepreneurship often involves risks. Taking into account the financial, psychological and social risks and by providing the necessary time and effort and taking various measures required, financial gain and personal satisfaction is gained as a result of the entrepreneurial activity. Entrepreneurship phenomenon occurs more frequently currently than at any other time (Gartner & Shane 1995; Thornton 1999) and 4% of all adults attempt to a start-up venture at any given time (Reynolds 1997).

Entrepreneurship has been described as the "capacity and willingness to develop, organize and manage a business venture along with any of its risks in order to make a profit." (Groumpos 2017).

An entrepreneur is a person that performs the entrepreneurship activity. Hence having slightly different requirements than business activity, an entrepreneur needs to have attributes and competencies tailored towards entrepreneurship. According to Kuratko (2014) The entrepreneur is responsible for organization, managing and assumption of the risks of a business.

> *Today, an entrepreneur is an innovator or developer who recognizes and seizes opportunities; converts those opportunities into workable/marketable ideas; adds value through time, effort, money or skills; assumes the risks of the competitive marketplace to implement these ideas; and realizes the rewards from these efforts.* (Kuratko 2016:4).

In the entreprenurship research there are two research approaches are significant towards roles of entrepreneurs in start-up or success of small and medium size businesses. These

are the personality and competency approach (Wagener, Gorgievski, & Rijsdijk 2010). In this researh we will focus on entreprenurial success with the competency approach.

2.2. Competence Models

Competency is defined as a hidden characteristic of personality with a casual relation to superior performance in a job. Spencer and Spencer (1993) defines a competency as “an underlying characteristic of an individual that is causally related to criterion-referenced effective and superior performance in a job or situation”. According to Spencer et al. (1993) a characteristic considered as a competency only if it predicts meaningful thing in the real world. i.e. a superior or effective performance. The criterion reference is a vital part of the definition of the competency. Similarly Klemp (1980) emphasizes that a competency leads to a superior performance in a job. Further Klemp (1980) suggests that a competency can be any human quality as long as it is *explicitly related to effective performance*.

Competency is a concept that has many faces and applications, and models of entrepreneurial competence are grounded in these various approaches to and notions of the concept of competence. Research and practice related to competence is typically driven by aspirations to achieve superior performance, and the potential for, in turn, economic gain or business success (Spencer et al. 1993).

Spencer et al. (1993) describes competency characteristics with an “iceberg model” according to which knowledge and skill competencies are more visible while self-concept, trait and motive competencies are more hidden.

Spencer et al. (1993) states there are five types of competencies i.e. motives, traits, self-concept, knowledge and skill and describes that a type of competency affects the ease and cost-effectiveness of development of a competency. Surface knowledge and skill competencies are easier and cost effective to develop compared to core motive and trait

competencies. The following figure illustrates the Iceberg Model.

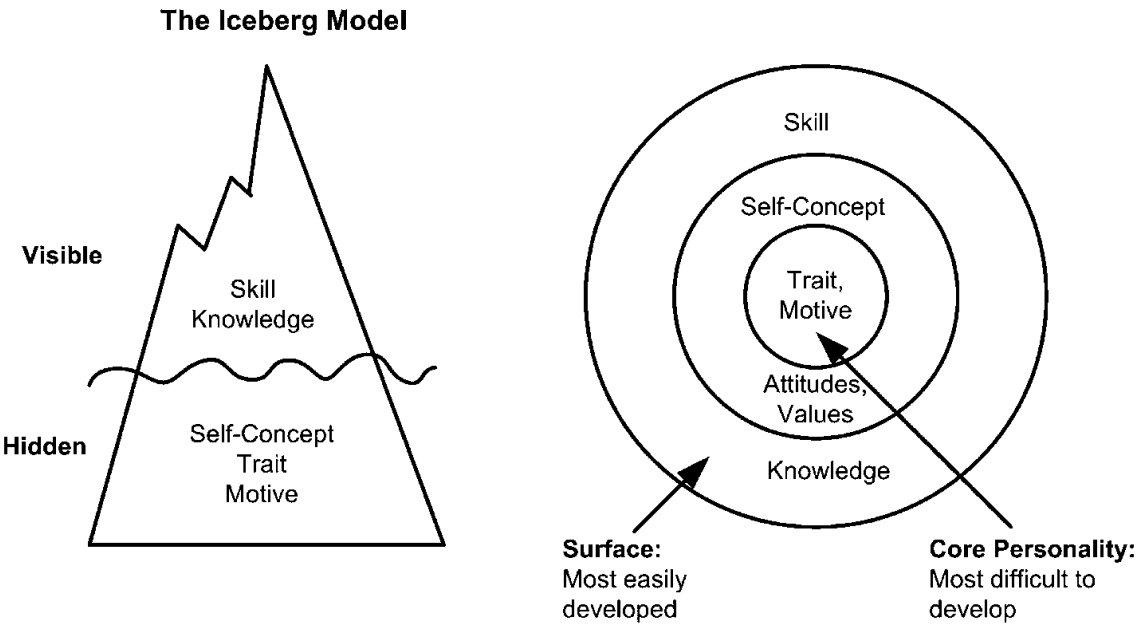


Figure 1. Central and Surface Competencies. (Spencer et al. 1993).

Spencer et al. (1993) categorizes competencies into two groups which are threshold competencies and differentiating competencies. Threshold competencies are basic skills are knowledge that are required to perform a job. These are essentially needed to perform the tasks in a job i.e reading, writing, computer literacy. On the other hand, differentiating competencies are the skills and knowledge which differentiates a superior performer from an average performer. For instance the level of achievement orientation implies a superior performance.

A competence model (or competency model) is a that is developed from various competencies and categorized competencies (Chang, Eklund, Kantola & Vanharanta 2009). According to Chouhan & Srivastava (2014) competency models are effective

measurement tools that assist employees to have a common language and discern the meaning of superior performance. Additionally, *competency-based HRM is a core strategy to help align internal behavior and skills with the strategic direction of the organization as a whole* (Chouhan & Srivastava 2014).

Tucker & Cofsky (1994) describes that there are five ingredients of competency. These are knowledge, skills, self concepts and values, traits and motives. Chouhan & Srivastava (2014) described these components that constitute concept of competency, contribute and transform and results into critical behavior and then performance eventually. Figure x illustrates the concept of competency.

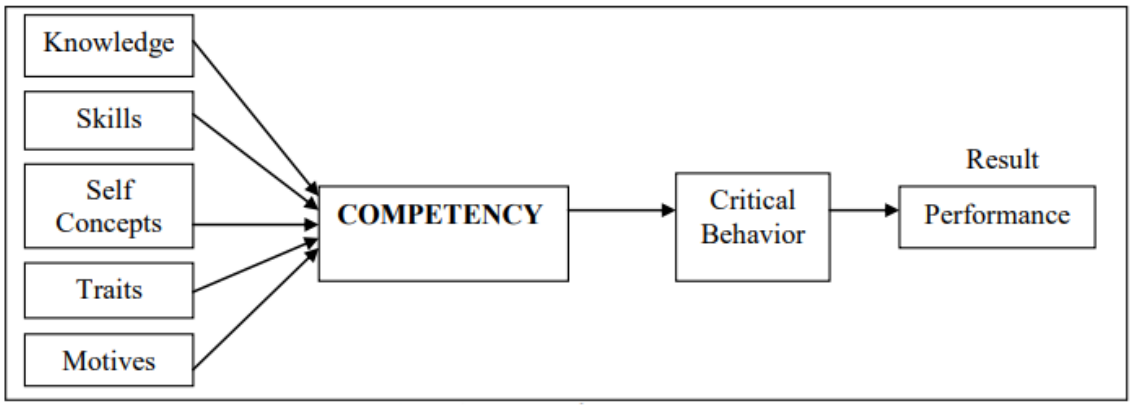


Figure 2. Concept of competency. (Chouhan & Srivastava 2014).

2.3. Self-Assessment

Self-assessment is a method of looking at oneself to evaluate or assess elements of one's identity. Sedikides (1993) suggests that according to the self-assessment perspective, people are motivated to obtain a consensually accurate evaluation of the self. In order

to accomplish this objective, people are interested predominantly in the diagnosticity of self-relevant information, that is, the extent to which the information can reduce uncertainty about an aspect of the self. People seek diagnostic information regardless of its positive or negative implications for the self and regardless of whether the information affirms or challenges existing self-conceptions. In sum, self-assessment serves the function of increasing the certainty with which self-knowledge is held.

2.4. Creative tension

Creative tension is defined as the gap between vision and present reality (Senge 1990). If no gap existed, no action would be needed to move towards the vision. This gap is called creative tension. Creative tension is seen as an impulse to take action. According to Senge (1990) the apposition of vision, what we want, and a clear picture of current reality, where one currently is relative to what they want, generates so called "creative tension": a force to bring them together. This is caused by the natural tendency of tension to seek resolution. According to Senge (1990) seeking for creative tension in life is key to one's personal mastery.

Creative tension (CT) is formulated as the following:

$$CT = vision - current$$

In order to make it possible to compare different datasets of creative tension Evolute index (EI) was developed. Evolute index can be seen below.

EI = vision / current

In this study we will use Evolute index when comparing the Case 1 and Case 2 datasets.

2.5. Competence Model of Tricuspoid 2.0

Tricuspoid 2.0 tool of Evolute system is used in this research. Competence Model of Tricuspoid divides competencies of entrepreneurs into two main groups: personal competencies and social competencies. According to Goleman (1998) personal competencies determine how we manage ourselves and social competencies determine how we handle relationships. Personal competencies and social competencies are further grouped under the following sub-groups: cognitive capabilities, empathy, social skills, self-control, self-knowledge and motivating oneself.

In the following table the competence model of Tricuspoid 2.0 is presented. A list of entrepreneurial competencies in the model and the sub-groups that they belong to is presented in Table 1.

Table 1. Competence model of entrepreneurs. (Palonen 2005).

Main competence groups	**Competence groups**	**Competencies**
Personal competencies	Self-control	Trustworthiness, Flexibility, Innovation (Innovativeness), Seeking information, Stress tolerance, Production efficiency, Decision-making skills, Adventurism
	Motivating oneself	Achievement orientation, Initiative, Optimism, Flow
	Cognitive capability	Analytical thinking, Conceptual thinking, Professional and technical knowledge, Strategic thinking, Meta-cognitive skills, Problem-solving skill
	Self-knowledge	Emotional awareness, Self-confidence, Self-assessment, Acknowledging own values
Social competencies	Social skills	Conflict management, Management, Leadership, Collaboration
	Empathy	Understanding others, Developing others, Service orientation, Change management

2.6. Competencies of Entrepreneurs

Competencies class in the competence model of Tricuspoid 2.0 provides an analysis of competencies of entrepreneurs for trustworthiness, flexibility, innovation, seeking information, stress tolerance, production efficiency, decision-making skills, adventurism, achievement orientation, initiative, optimism, flow, analytical thinking, conceptual thinking, professional and technical knowledge, strategic thinking, meta-cognitive skills, problem-solving skill, emotional awareness, self-confidence, self-assessment, acknowledging own values, conflict management, management, leadership, collaboration, understanding others, developing others, service orientation and change management. In the following sub-chapters we will describe these competencies in detail.

2.6.1. Trustworthiness

Trust is the "*faith or confidence in the intentions and actions of a person or group to be ethical, fair and non-threatening concerning the rights and interests of others in social exchange relationships"* (Carnevale & Weschler 1992). Trust is based on an understanding of the likelihood that other agents will act in an expected manner (Gambetta 1988).

Trustworthiness is about promises being delivered. Trustworthiness maintain trust between people which emphasizes e.g. to keep schedules for projects, arrive on time on meetings and complete work as agreed. Trustworthy people are preferred in entrepreneurial world which makes it a critical competence for entrepreneurship.

A comprehensive literature review of Welter and Smallbone (2006) reveals the research on trustworthiness in entrepreneurship context. One research focused on importance of trust on network building which is seen as important for venture creation and business growth. (Liao & Welsch, 2005; Zahra, Sapienza & Davidsson 2006). According to Anderson & Jack (2002) trust resembles a "glue and lubricant" in networks and holds them together. Aldrich 2000:128 states that trustworthiness is especially important for innovative new entrepreneurs that enter with new products or services into the market. Trustworthiness of the entreprenurs is assessed by e.g. clients, customers, and suppliers throughout the market entry process. Trust in others is essential in the entrepreneurial process (Anderson & Jack 2002; Cooke, Hebson & Carroll 2005). Trust plays a role in formation of networks.(Anderson & Jack 2002). In highly turbulent environments trust replaces the use of formal legal systems where rules specifically addressing the needs of entrepreneurship is non-existing or not yet matured. An example to this can be relying largely on networking and trust when mobilizing resources and not using highly bureaucratic structures (Ledeneva 1998; Welter & Smallbone 2001).

2.6.2. Analytical thinking

Analytical thinking is a cognitive process that involves breaking down the information into components by the usage of logical and systematic reasoning to understand, analyze, and resolve problems. (Boyatzis 1982:109; Spencer et al. 1993:68; Zwell 2000:45). Analytical thinking implies the ability to break problems into smaller chunks and to identify casual relationships between them. (Ohmae 1982:12-13; Spencer et al. 1993:68). According to Spencer et al. (1993:68) analytical thinking behaviour implies one that prioritizes tasks in order of importance, breaking into pieces and recognizing likely reason of an events and several consequences of actions. An analytical thinker notices obstacles and thinks about further steps, identifies several options as solutions and then chooses one that has the higher value.

Therefore Analytical thinking is a crucial competence for an entrepreneur considering the complex problems one likely encounter during their entrepreneurial affairs. Since analytical thinking is efficient when choosing the favourable alternative among others in a complex situation can create an advantage for an entrepreneur in such situations.

2.6.3. Conceptual thinking

Conceptual thinking is the ability to use models, theories or frameworks to interpret or to explain events. Conceptual refers to the ability to identify patterns and to the see the overall picture or thinking so called “outside of the box”. Conceptual thinking refers to thinking beyond the obvious, surface information, and getting to the root cause by an indirect and creative approach to open new ways of thinking. Conceptual thinking term is used to describe ways of thinking that explore equivalence-of-meaning representations and patterns of associations among ideas, relations,and underlying issues.(Shafrir & Kenett 2010). Boyatzis (1980) emphasizes that people that conceptualize in their thought process recognize patterns in a mix of information and develops a pattern or structure

distinguished from a set of facts.

Entreprenurship involves complex and broad problems. In order to resolve the possible problems in their work entrepreneurs can divide the problem into parts use conceptual thinking to resolve it. Thus conceptual thinking is seen as an important competency for entrepreneurs.

2.6.4. Metacognitive skills

Metacognitive skill is the ability to analyze one´s own performance and to use this estimation as a tool for learning. Metacognition is “knowledge that takes as its object or regulates any aspect of any cognitive endeavor.” (Flavell 1978). In general, metacognition can be described as the self-awareness of one’s own cognitive processes.

Shephard, Patzelt & Haynie (2010) suggests that an entrepreneurial mindset is naturally metacognitive, and entrepreneurs formulate and inform "higher-order" cognitive strategies in the pursuit of entrepreneurial purposes. Metacognition is defined by the following five dimensions: metacognitive knowledge, metacognitive experience, metacognitive control, goal orientation, and monitoring (Flavell 1979, 1987; Griffin & Ross 1991; Nelson 1996; Shepherd et al. 2009).

2.6.5. Problem-solving skill

Problem is a circumstance that prevents the achievement of something. Problem is defined as the mismatch between current state and the desired state (Robbins & Judge 2008). Similarly (Newell & Simon 1972:72) defines a problem as the situation when one wants something but does not know an immediate series of actions to achieve it.

Problem-solving skills is the ability to recognize and solve problems. Problem solving

skill is discussed in various disciplines. Problem solving in psychology describes the process of finding solutions to life-related issues (Brandell 1997). According to Robbins & Judge 2008 in order to solve a problem one needs to recognize initially. Problem solving skills are shown to be essential success factors for organizations and personal career of individuals (Anderson & Anderson 1995).

2.6.6. Professional and technical knowledge

Professional and technical knowledge is about seeking, maintaining and distributing professional, technical or managerial information. High-performer entrepreneurs possess the adequate amount of professional and technical knowledge in their domain. Professional and technical knowledge of an entrepreneur could enhance their company performance and tangibly and assure that they remain ahead in the competition.

Bhatia (2004) defined professional expertise as *"a combination of competencies, namely discursive competence, which includes genre knowledge, disciplinary knowledge and professional practice*". According to Bhatia (2004), "*professional expertise comprises the elements of discursive competence, disciplinary knowledge, and professional practice.* Bhatia (2004) further explained it as *the ability to identify, construct, interpret and successfully exploit a specific repertoire of professional, disciplinary or workplace genres to participate in the daily activities and to achieve the goals of a specific professional community* (Imran 2014).

Bhatia (2004) states that professional expertise comprises the components of discursive competence, disciplinary knowledge, and professional practice. Further he states *being a complex multidimensional concept, it is in need of a correspondingly complex approach* (Bhatia 2004).

According to Oakeshott (1962), the main characteristic of technical knowledge is susceptibility to precise formulation. In other words technical knowledge is formulable. According to Alic J.A. (1993) technical knowledge has the following characteristics. It is

explicit and professionally codified e.g. published scientific technical liteature, patents and other documents; or tacit if it is individual technical knowledge that is based on rules of thumb, heuristics, judgement and intuition.

2.6.7. Strategic thinking

Strategic thinking is a mental or thinking method which is cognitive that can be applied to both individual or organizational context. It is a tool that assists identifying and evaluating the current and help control the future. In the organizational context it can be interpreted e.g as understanding of the own organization, its position in the market and the changes in the business environment. It is critical for an entrepreneur to think strategically to make correct decisions and act accordingly in a competitive market. This would effect both the competitiveness and life of the enterprise. According to Ansoff (1965) the concept of strategy has two meanings. One is a pure strategy which defines a *move or a specific series of moves by a firm, such as a product development programme in which successive products and markets are clearly delineated.* The other meaning of *strategy is a grand or mixes strategy which is a statistical decision rule for deciding which particular pure strategy the firm should select in a particular situation* (Ansoff 1965). Zahra & Nambisian (2012) emphasized the need of executives navigate in a constantly changing competitive environment. They further emphasize the positive effect of quality strategic thinking on competitiveness and entrepreneurial insight together with strategic thinking which aids creating, shaping, navigating, and exploiting business ecosystems.

2.6.8. Achievement orientation

Achievement orientation is the drive towards a high standard of excellence. People with achievement orientation set challenging goals and work hard to achieve them. Utsch &

Rauch (2000) suggest that Achievement orientation is an inclination towards performance improvement and achievement under challenging and competitive conditions. McClelland (1961) suggests that entrepreneurs have a high need for achievement and high achievers prefer the situations that are characterized by individual responsibility, moderate risk-taking, knowledge of results of decisions, novel instrumental activity and anticipation of future possibilities. People that are achievement oriented are motivated by the propect of achievement rather than money.

2.6.9. Creativeness

Creativeness is the state of being creative. Creativeness and creativity are often used interchangeably. It is the ability to generate new ideas or concepts. There is no one definition of creativity and various researchers define creativity with different attributes. Creative people are sensitive to all types of opportunities whereas people that are not creative miss opportunities due to high control mechanisms. Maslow (1968) suggests that creativity is not only an artsy type of activity such as in music or art, which creates a novelty product as an output, but also demonstrated as self-actualization in self-actualizing people. Self-actualization is defined as using your own potential on the work that own potential allows. According to Maslow (1968) society acts as a great inhibitor and alienates a person from being own self. Creative individuals overcome this inhibition by being more independent from the rules and norms of the society, follow their impulses by not being afraid of what might society think. Creative people are self-accepting and self-actualizing. Furthermore Maslow (1968) suggests that creative people do not depend on safety, definiteness and order. A creative person is open to and adaptable to change and accepts new experiences.

2.6.10. Flow

Flow is the mental feeling of pleasure resulting from succesfully working close to one's limits. Flow is considered more desirable compared to monotone work settings. Challenging but achievable tasks help an entrepreneur to keep his or her interest in their business. Flow is overall and optimal activity for one rather than boring or highly difficult and sttressful. This constitutes the main advantage that flow provides. Csikszentmihalyi (1998) defines flow as the moments in one's life with high degree of skill and commitment and involves high amount of concentration. Csikszentmihalyi (1998) suggests that many experiences in life are pre-determinable in terms of positive and negative feeling outcomes that it gives to a person and these are controllable at some level. Flow can be found in both personal or professional activities and when an individual experiences flow his or her skill level matches the difficulty of the task, they achieve high focus and concentration. Eventually they achieve an enjoyment from this activity as well. Csikszentmihalyi (1990) explains that flow states can be controlled by setting ourselves challenges are neither too hard nor too easy for our skills. One can order the data that enters our consciousness with predetermined objectives and thus enhance the quality of our life.

2.6.11. Initiative

Initiative is the ability to see new possibilities and to seize opportunities. Difficulties and obstacles may be part of the entrepreneurial process. Hence entrepreneurs need inititave to overcome these to achieve goals. Personal initiative is a trait that is characterized with self-starting, proactive, and long-term oriented behaviour in addition to persistence towards obstacles (Frese, Fay, Hilburger, Leng & Tag 1997; Frese, Kring, Soose & Zempel 1996). Personal inititive is critical for entrepreneurs (Frese 1995), which is important for entrepreneurs while achieving their goals. Personal initiative includes to

self-start an action, proactive and future oriented behavior and to overcome obstacles on the way towards the goal (Frese 2009). According to empirical evidence entrepreneurs have higher level of initiative compared to employees or managers. (Utsch, Rauch, Rothfuss, & Frese 1999).

Historically, the entrepreneur has been regarded as an autonomous, highly self-reliant innovator and as a high achiever in the economy. According to Henry, Hill & Leitch (2003) entrepreneurs are enthusiastic about taking initiative and move projects forward in addition to being proactive and seeking new opportunities. People with initiative take responsibility of the situation and their own actions whether it might end as a success or failure. Their motivation might be to solve a problem, to lead or to make a personal impact. Frese (1997) suggests that personal initiative will become more important in work in the future due to that future work places will require a high degree of self-reliance.

2.6.12. Optimism

Optimism is about pursuing goals regardless of obstacles and setbacks. Optimists see the world from a positive point of view. This can be helpful for an entrepreneur to get encouraged to try new things. Optimism is at its basic definition is conversly related to hopelessness, a risk factor for depression. (Alloy & Abramson 2006). *Optimism and pessimism are broad, generalized versions of confidence and doubt; they are confidence and doubt pertaining to life, rather than to just a specific context.* (Scheier & Carver, 1992).

Carver (2014) defines optimists as people with expectations of good things to happen them. Optimists and pessimists differ mainly with the way they deal with life. Carver(2014) suggests that optimists and pessimists approach to life differently. Higher level of optimism is related to better well-being, less avoidance, more engagement and being proactive regarding one's own health and better physical health in general. According to Carver(2014) optimist have an energetic, task-focused approach towards

their goals. He further states that optimist have better relationships compared to pessimists. Carver (2014) suggests that people high in optimism are better at limiting their negative emotions and they work more efficiently with their close relationships and experience less conflicts in their network. Optimists appear to be more resilient towards stressful life events that are risk factors to psychopathology (Ellicott, Hammen, Gitlin, Brown & Jamison 1990; Finlay-Jones & Brown 1981).

2.6.13. Seizing opportunities

Seizing opportunities is preparedness to see open opportunities where one can use his or her own capabilities. Successful entrepreneurs take risks if required due to the possibility of taking risks provides opportunities for success. Successful entrepreneurs possess the ability to discover and seize these opportunities (Gras & Mendoza-Abarca, 2014; Man, Lau & Chan 2002; Markman & Baron 2003; Philips & Tracey 2007; Rezaei-zadeh, Hogan, O'Reilly, Cleary & Murphy 2014; Tumasjan & Braun 2012). Moreover successful entrepreneurs are aware of potential returns.

2.6.14. Self-capacity (capability)

Self-capacity or capability is the perception of one's own abilities and capabilities. Fraser & Greenhalgh (2001) describe the difference between competence and capability. Capability is different than competence. Competence is what one knows or are able to do in terms of knowledge, skills, attitude. Capability on the other hand is is the extent to which one can adapt to change, generate new knowledge, and continue to improve their performance (Fraser & Greenhalgh 2001).

While competence is a word used to describe skills an individual have capability can be used both for an individual or an organization. Competence is about response to the

current need whereas capability is about delivering what is required. Capability is often used in to describe the ability to deliver even in an unexpected situation due to being highly adaptable. According to Stephenson (1994) capability is a holistic concept that includes culture, comprehension, competence, communion, creativity and coping.

Hase & Davis (1999) define the difference between competent and capable as the following:

> *"Capable people are more than competent, they are creative, know how to learn, have a high level of self-efficacy, can use competencies in novel as well as familiar situations and work well in teams and also they are more likely to be able to deal effectively with the turbulent environment in which they live by possessing this "all round" capacity."*

2.6.15. Adventurism

Adventurism is the will to consciously make choices that include risks or potentially lead to losses. Adventurism can be seen in e.g. politics and business. Entrepreneurship usually involves capturing window of opportunities and risk-taking is required to catch the opportunities. Adventurism is helpful for entrepreneurs to take risks although often potential outcomes weigh higher than the risks according to an entrepreneur's assumptions. According to Hamilton(1978) adventurism has two distinguishing elements. First it involves great risk taking of which the consequnces are not pre-calculated and second these activities are done for significant social, political, and economic benefits that could be obtained if the project succeeds.

Adventurism involves personal risks such as one's own safety which differs it from a typical capitalist risk taking behaviour. Weber (1958:20) distinguishes the risks are taken in the modern business that are long-term and calculated methodically and the "irrational" short-term recklessness identical to adventurism.

2.6.16. Decision-making skills

Decision-making skills are about making the right decisions at the right time. An entrepreneur frequently has to make multiple decisions in a limited amount of time. Lack of information and uncertain environments as it is during the process of entrepreneurship makes decision making a challenge. Thus effective decision-making skills becomes crucial for majority of the time of the entrepreneurial activity.

Vecchio (2006) categorizes decision-making under two groups: personal decision making and organizational decision making. Personal decision making involves decisions that one makes in personal life. Personal decision making affects the persona life of the one that makes the decision. Organizational decision making on the other hand involves decisions that that are made regarding to organizational problems and decision regarding practices in an organization.

2.6.17. Flexibility

Flexibility is the ability to handle the ambiguities of organizational life. Flexible people have an ability to manage multiple demands without losing focus. In addition flexible people are open to new experiences and viewpoints. Flexibility is also called as adaptability that refers to adaptability of one to work, situations, individuals or groups. (Spencer et al. 1993). Flexible people can perceive different and opposing viewpoints about a topic and adapt the required approach as the situations requires such as the changes in job requirements or organizational changes (Spencer et al. 1993). According to Spencer et. al. several features indicate a flexible person e.g. recognizing whether a opposing viewpoint is valid, adaptability to change at work, flexilibity when applying rules or procedures specific to each situation in order to achieve organizational goal, altering ones own behavior or approach to suit the situation. Flexibility positively affects impact and influence and the managerial competencies (Spencer et. al. 1993).

2.6.18. Innovativeness

Innovativeness is the natural and open attitude towards new ideas, attitudes and information. Innovative people embrace open-mindedness towards new ideas. Entrepreneurship often involves a type of innovation in its business model. This is what differs it from a regular type of business activity and create new market opportunities or advantage.

Van Assen (2000) defines innovativeness as "the degree to which an individual initiates, implements, realizes or early adopts change, improvement and renewals." According to Van Assen (2000) innovation is not a basic competence of an individual but a combination and portrayal of multiple attributes: initiative, willingness to change and improve, and problem solving.

In the entrepreneurial context Rauch (2009) defines innovativeness as the tendency to indulge in creativity and experimentation through the release of new products or services in addition to technological leadership via R&D in new processes. Ngah & Salleh (2015) suggests that the innovativeness of entrepreneurs is critical for the company to succeed in business ventures, particularly in global uncertainty.

2.6.19. Production efficiency

Production efficiency is about doing tasks rapidly and according to high standards. Production efficiency in a process refers to the level at which a company reaches the maximum output it can from the inputs and cannot increase the output without additional costs. It is the optimal state of the production. Efficiency is related to focusing on minimization of costs and maximization of profits by focusing of best use of the resources of the company. Efficiency can be about outcomes of humans as well as e.g. machines, resources and technologies.

According to Burki & Terrell(1998) the production frontier is the “maximum output possible for each combination of inputs” and the companies that produce up to this limit are efficient. Burki & Terrell(1998) further show that entrepreneurs with at least primary education have higher efficiency in their entrepreneurial affairs. In a competitive business environment it is important for a company to be efficient to compete and survive in the long run. A more productive enterprise can deliver products that are less costly than its rivals and can create more revenue at lower prices.

2.6.20. Seeking information

Seeking information is the curiosity to know more about things, people or issues. It is an effort to acquire more information. An information need arises when one recognizes that their knowledge is not enough in something to reach the goal they have which is a conscious effort to obtain information as a reaction to the need or a gap of one’s knowledge. Spencer et al. (1993) relates information highly to initiative which is another competency discussed as important in entrepreneurship. Furthermore the author states that information seeking arises from an underlying curiosity that leads to know more about things, people or issues. The information seeking competence is the extent of individual goes to seek information. This includes a range from questioning the people involved, to doing extensive research and to involving others in the information seeking process (Spencer et al. 1993:34). Spencer et al. further defines an information scale which shows different levels of information seeking from using only the given information to digging deeper to digging deeper and involving others to seek information. Information seeking is the prerequisite for initiative, conceptual thinking, analytical thinking, interpersonal understanding, technical expertise and customer service orientation and is often implies teamwork and cooperation. Spencer et al. (1993:36).

Hardy (1982) suggests in his cost-benefit model that when seeking information people choose their information sources based on their anticipated benefits balanced against possible costs. According to Kirzner(1997) advantageous information-seeking

behaviours are at the very hearth of alertness and businesses that are alert can better recognize and exploit information asymmetries as referred to as “entrepreneurial arbitration” by the author.

2.6.21. Stress tolerance

Stress tolerance is to maintain performance when facing workload pressures and or organizational impediments. Entrepreneurship involves stress at the establishment and initial running of one’s business. Stress tolerance is an important competency for an entrepreneur. Stress level varies among different occupational groups (Narayanan, Menon & Spector 1999). It has been argued that self-employment is one of the most stressful in occupational options so the notion that entrepreneurship is challenging is pervasive. (Uy, Foo & Song 2013).

Stress management is the skill to deal with emotions in ways that helps keep one's and others in good physical and emotional health and facilitate the fulfilling of one's feelings when needed that involves containing and expressing one’s feeling according to the need and helping others with the same. Zwell (2000:43). People that are strong in this competency are kind and use emotional expression in commucation that helps with getting things done e.g. remaining calm under pressure and express emotions that relieves stress without affecting relationships or productivity negatively. (Zwell 2000).

2.6.22. Acknowledging own values

Acknowledging own values is the ability to identify and consider own values and act according to own values. Values of one’s self has a significant importance on the business they found. Therefore it is important to recognize own values.

It is suggested by researchers that motivation for entrepreneurship stems not solely from an expectation of financial outcome but also related to other factors such as their own values. Values are standards that guide one's behavior and lead them to take a particular position on social issues and influence others' (García-Álvarez & López-Sintas 2001:210). Values are standards for judgment and behavior that serve as guiding principles in one's lives (Wright 1971; Williams 1979; Prince- Gibson & Schwartz, 1998). They guide an individual on what is right and good for themselves and others. Values are a powerful force guiding the individual beliefs, actions, expectations, and understanding of the concept of oneself. Values are the beliefs that we hold about what is good, right, and desirable for ourselves and others. Values constitute the ideal state for fulfillment of the individual as well as the needs of the collective. (Rokeach 1973; Schwartz & Bilsky 1987).

Importance of values appear according to the value hieararchy that expresses self-concept of an entrepreneur. Conger (2012) divided values of entrepreneurs into groups: economically oriented entrepreneur which are "traditional commercial entrepreneurs who take the role of profit maker for themselves and the firms they found", socially oriented entrepreneur that are unlike the traditional business they seek to engage in a venture explicitly focused on providing a social good (Sine & Lee 2009; Meek et al. 2010) and relationally oriented entrepreneur which are a mix of the two mentioned before. These entrepreneurs are commercial entrepreneurs but with an orientation toward social and/or environmental responsibility for themselves and the firms they found (Conger 2012).

People have a strong desire to express own values through actions which is seen as an essential source of motivation (Williams 1979; Schwartz and Bilsky 1987; Hitlin 2003). Therefore, values should have a deep impact on the goals that entrepreneurs seek to achieve and the opportunities that they seek.

2.6.23. Emotional awareness

Emotional awareness is the ability to recognize, understand and analyze one's own feelings. Situations involving interaction with other human beings are characteristically more strongly loaded with emotion than other situations in human behaviour. Moreover real-time environmental response requires to occur when the environment can quickly and unpredictably change (Simon 1967).

People that possess emotional awareness competence know about their emotions and their effects. *People with emotional awareness competence know which emotions they feel and why, realize the links between their feelings and what they think, do and say, recognize how their feelings affect their performance, and have a guiding awareness of their values and goals* (Goleman 1998:54; Jussila 2007:33).

2.6.24. Self-assessment

Self-assessment is the comprehension of one's own limits and strengths. “Accurate self-assessment is a competency in which people have realistic or grounded view of themselves.” (Boyatzis 1982:134). People that do accurate self-assessement are self-objective. (Bray, Campbell & Grant 1974), and aware of their strengths, weaknesses and limitations. (Boyatzis 1982:134). Boyatzis (1982) further elaborates that people with accurate self-asessment competency are capable of estimating the level of their strengths and weaknesses accurately which does not contain exaggeration or underestimation. These people are good at describing and evaluating the effectiveness of their performance in a particular situation. Additionally these people are able to estimate their relate the results of their actions to their specific strengths and weaknesses. People with self-assessment competency often seek to improve their weaknesses, especially if they also have the proactivity competency. (Boyatzis 1982).

2.6.25. Self-confidence

Self-confidence is a sense of one's self-worth and capabilities. It is the ability to present and defend one's opinion. According to Goleman (1998) self-confidence is one's self-worth and capabilities. Goleman (1998) later elaborates that people with self-confidence are able to express their views openly that are unpopular and act upon the way they perceive as right.

Benabou and Tirole(2002:877) argue that self-confidence is generally an optimistic view of the self and therefore seen as positive. Furthermore self-confidence makes it easier to make people happier, to convince others (rightly or wrongly) and improves one's motivation to undertake projects and endure in the pursuit of his goals. Studies suggest that entrepreneurs have higher degrees of confidence compared to general population as as well as managers (Koellinger & Minniti 2006).

2.6.26. Change management

Change management is the ability to guide the organization through big changes. Ways of doing things change in time and as a consequence old ways of doing things become obsolete and realizing organizational goals with these old methods or ways become no longer efficient or effective. This is the effect that forces organizations to change. The goal of the change is to reduce the gap between the current reality and the ideal reality where the company wants to be. (Hersey & Blanchard 1988).

Organizational change management may refer both the change process itself in different areas of the organization while change management refers to the effects of change on the workers, people and teams.

One essential factor for change is the leadership. Change needs active involvement which requires leadership. By leading the change in the organization effectively an entrepreneur

can ensure the minimization of effects of change on the productivity and ensure the well-being of employees before and after the change.

2.6.27. Developing others

Developing others is to notice other people's needs for development and promotion of their abilities. According to Goleman (1998) developing others competency is about "sensing others' development needs and bolstering their abilities. Developing others competency is performed when a leader works as a counsellor, helping workers set goals, reestablishing values and increasing their skillset. (Goleman, Boyatzis & Mekee 2002, 62). According to the research by Goldstein (1992), Tannenbaum & Yukl (1992), and Wexley & Latham (1991) show that developing the skills of subordinates leads to higher job satisfaction and organizational performance. Similarly, Kouzes & Posner (1987) and Peters & Austin (1985) found that effective leaders acknowledge the achievements and contributions of subordinates. Skills in developing others are crucial for effective leadership and successful management (Spencer et al. 1993; Goleman 2000).

It is seen that developing others competency is a less formal and more personal skill. Intention that differentiates developing others from other interpersonal skills is the intent to teach, and it includes a "genuine intent to foster the learning and development of the others." (Spencer et al. 1993). Similarly Goleman et al.,(2002) emphasized that leaders with this competency are natural mentors that can understand and support other's goals, strengths and weaknesses and provide timely and constructive feedback.

Empirical research on the effects of coaching and mentoring indicates that learning subordinate skills is positively related to managerial performance, while descriptive research shows that effective managers play a more active role in subordinate development (Illiash 2013).

2.6.28. Service orientation

Service orientation is the skill of recognizing or anticipating customer needs and fulfilling them. Various authors show that service orientation had a significant influence on organizational performance (Homburg, Hoyer & Fassnacht 2002; Kohli & Jaworski 1990; Narver & Slater 1990; Lytle, Hom & Mokwa 1998; Lytle, Lynn & Bobek 2000).

According to Hogan, Hogan, and Busch (1984) service oriented people have a propensity to be helpful, thoughtful, considerate, and cooperative. Intrinsically service orientation derives from a collection of attitudes and behavior of employees in an organization which affects directly the nature and quality of service that organizations delivers to its customers and the interaction between the organization and customers (Lytle et al. 1998).

2.6.29. Understanding others

Understanding others is the ability to sense the feelings and perspectives of other people. Understanding others, also known as empathy, is *the ability to be aware of and understand the feelings of others*. (Bar-On 2000). Empathy, or understanding others, has become popular with the famous book of Goleman's 1998 book on emotional intelligence. Prior to Goleman (1998), Sprecher (1959) discussed about the concept of empathy in his study that researched 107 engineeers and found the need of understanding others in cases of technical problems involve interpersonal relationships. People with empathy are able to understand (Rahim & Psenicka 2005) and relate to (Goleman et al. 2002) the values, worries, fears, and positive emotions of others. Cherniss & Caplan (2001) emphasizes the necessity of empathy for trust. Ekvall (1996) suggests that empathy is needed prior to proposing unconventional ideas. This is especially relevant to entrepreneurship because it may involve more unconventional ideas compared to usual entreprises.

2.6.30. Collaboration

Collaboration is the ability to work together with others towards common goals. According to Spencer et al. (1993) teamwork and collaboration competency "implies a genuine intention to work cooperatively with others, to be part of a team, to work together as opposed to working separately or competitively". Kanter (1983) and Porter (1985) suggest that to share experiences and expertise between departments in an organization lead to "capture synergy and create new products and services". This seems especially important considering the activity of entrepreneurship. Tjosvold (1988) suggests that cooperative goals combined with interdependence employees of an organization understand that they aim to reach a common goal and it is beneficial as well for them individually to aid each other.

Research shows that cooperation cultivates stronger work relationships, mood and productivity in comparison to competition and independence especially for "problem solving and other tasks that require blending resources. (Johnson, Maruyuma, Johnson, Nelson & Skon 1981; Johnson, Johnson & Maruyuma, 1983). Meunier-Fitzhugh & Piercy (2011) emphasized the role of upper management in enhancing the collaboration in an organization. The author suggested that weekly meetings between department heads and a rewarding system based on the organizational performance enhance collaboration among the departments and individuals of the organization.

2.6.31. Conflict management

Conflict management is the ability to negotiate and resolve disagreements between people. People who are good at conflict management search for win-win situations or solutions. The conflict management competency deals with negotiating and resolving disagreements between people (Goleman 1998). Conflicts can be resolved in ways without attacks or criticizing by knowing when to compromise and when to take a stand

(Zwell 2000:38). It was argued by researchers that conflict enhances the effectiveness of strategic teams by facilitating the understanding of complex problems and helping development of quality solutions. (Amason, 1996; Cosier 1978; Bantel & Jackson 1989; Eisenhardt & Bourgeois 1988; Mason & Mitroff 1981; Schweiger, Sandberg & Rechner 1989). Similarly while conflict has historically been considered destructive, researchers found that conflict can improve effectiveness in a group (De Dreu & Van de Vliert, 1997). One way to manage conflicts is expressing disagreements in a way without an attack or criticizing by knowing when to compromise or take a stand. (Zwell 2000:38).

2.6.32. Leadership

Leadership is the management activities that are centered upon human beings. There is no one definition of leadership. In the literature we see theories on traits (Locke et al. 1991); situational interaction, function and behavior (Marshall 2016); power, vision and values (Richards & Engle 1986); charisma, and intelligence (Chin 2015). Traits are especially emphasized when distinguishing leadership from management.

> Leadership might be seen as activity that is visionary, creative, inspirational, energising and transformational, whereas management might be seen as dealing with the day-to-day routine, much more transactional and so requiring good operational skills(Gold, Thorpe & Mumford 2010).

Although they are often used together leadership and management are slightly different. Management is a method of organizing things by monitoring, making plans, maintaining control and applying routines(Gold et al. 2010; Hunsaker 2005). On the other hand leadership has a social influence factor. In leadership, inspiration and influence are used to maximize the effectiveness of employees. (Hunsaker 2005).

2.6.33. Management

Management is about the management activities that are centered upon matters and things. Management is the activity of directing a group or organization through executive, administrative, and supervisory positions. Katz later elaborated that management tasks are usually task oriented (Katz 1955).

Katz defined the management as exercising direction of a group or organization through executive, administrative, and supervisory positions (Katz 1955). Katz thought that management responsibilities are usually tasked-oriented, and it involves developing staff, mentoring persons with high potential, and resolving conflicts while maintaining ethics and discipline (Katz 1955). According to Kotter (2001) management involves planning, organizing, budgeting, coordinating and monitoring activities for group or organization in which a formal directing and controlling is apparent. When it comes to difference between leadership and management Yukl (1989) suggests that managers focus on the current smooth running of the organization whereas leaders think for the long term and test grounds for different positions and functions

3. RESEARCH METHODOLOGY

3.1. Research Design

This research involves a case study in which empirical data was collected from University of Vaasa PhD students using Tricuspoid 2.0 tool of Evolute system. In addition a comparative study is done between results of this this study and an earlier entrepreneurial study that used same tool to collect and analyze data from Girona University MSc students. Further details of this analysis will be provided in coming chapters.

Empirical data used in thesis was collected by utilizing Evolute system. Evolute system has variety of tools for specific purposes. For this study Tricuspoid 2.0 (Entrepreneurs' Competencies) was used. This tool aims to provide a generic model with a self-assessment approach to evaluate entrepreneurial competencies of the respondents. The assumptions of using the self-assessment is that the respondents are self-aware, capable of evaluating themselves to determine their current standing and they are able to evaluate and determine their future needs. The self-evaluation system Evolute, and the Tricuspoid 2.0 tool of it that is specifically used in the entrepreneurial assessment purpose, provides the respondents with their current state, future state and creative tension for various competences in entrepreneurship.

Tricuspoid 2.0 consists of 99 pre-formulated questions, with a focus on the competencies of entrepreneurs. Questions are presented in the form of statements and then the user is asked to choose own level from three scales. The user interface of Tricuspoid 2.0 can be seen in Figure 2. This figure describes the usage of this tool. There are three scales are provided for users to choose their level for each. Arrow a represents the current level of the respondent or the statement. Arrow b indicates the target level at which the respondent desires to see himself or herself, arrow c represent the importance of the statement to the respondent and finally the double right arrows ">>" shows the button to click to proceed with the next question.

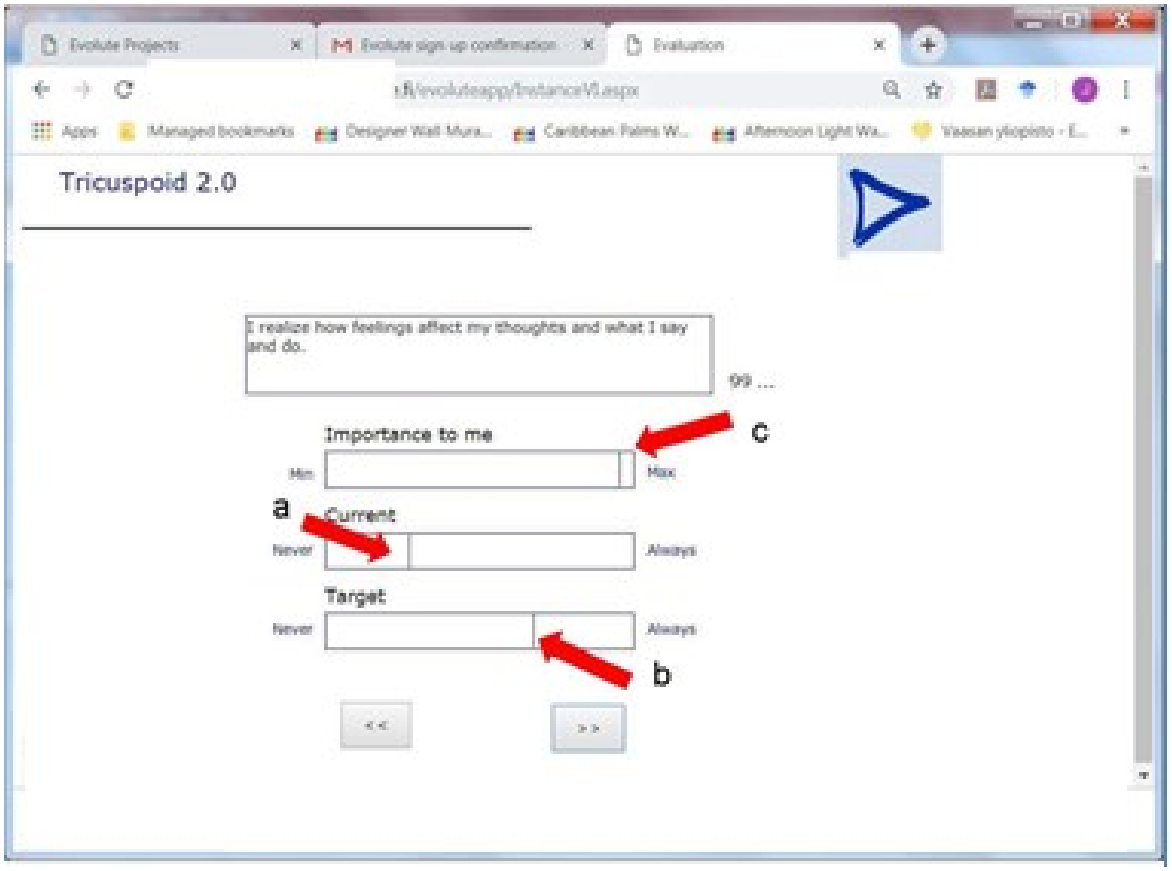


Figure 3. User Interface of Tricuspoid 2.0 for Self-Evaluation.

Considering that the entrepreneurship is usually a highly skill based activity that often requires involvement of the individual skills of one self-assessment can be considered as relevant and reliable method to assess competencies of entrepreneurs. It provides a clear overview of the various states of the people for future entrepreneurship and facilitate the future discusses on this.

3.2. Current and Future State

Current state describes level of each statement according to respondent at the time of answering. Target state describes the level of each statement according to respondent depending on what level at that competency they desire to be at in future.

3.3. Creative Tension

Creative tension is used as an indicator in Evolute. Senge (1990) defines creative tension as the difference between one's current and target innovative competence. It is suggested that this force draws the current state and target state together. Creative tension becomes useful when choosing which competencies to focus on for development. It provides a clear representation for the needs of an individual or group.

Evolute provides both individual results and group level results. Group level results are useful for evalution of a group for instance from an organization. These results would help with future training efforts of the organization for this specific group of people. In this study these are the PhD students of University of Vaasa. Knowing the states and creative tension of competencies help both the organization and the individual. For the university management it eases of management of future training programmes and for the individual it provides a clear picture of the own self.

Competencies with higher creative tension are the ones to be focused when it comes to training for the competencies. Because these indicate on which the individuals in the group that put the highest emphasis with a tendency to be developed. Focusing on competencies with higher creative tension facilitate a better outcome for the training efforts. It facilitates the training process by proving a better focus for the decision maker to which competences to focus on in case of limited resources.

3.4. Data collection methods: Evolute system & Tricuspoid tool

This thesis uses a self evaluation software tool called Evolute which is used through internet. Evolute is hosted on a website and requires user to register and log-in to enter their responses. This thesis presents an application of the Tricuspoid 2.0 competence model by using the data from 26 University of Vaasa PhD students. As being a student of the University of Vaasa the author was aware of the window of opportunity of PhD students in the entrepreneurial field. Furthermore PhD students can be seen as good candidates for entrepreneurship considering the learning outcomes of their study programme and their skillset match. This lead the data collection from this group.

Evolute system was used in this thesis. Evolute is an online self computing proprietary technology that can be accessed through evolute.fi web address. Usage of internet is common these days for collection of empirical date mainly due to its advantage of access without time and place limits. 99 pre-formulated statements were provided as the part of Tricuspoid 2.0 tool. A number of these statements represents one competence. Competence model of evolute, which comprises these competencies is mentioned in Table 1, listing all these competencies.

Respondents were sent an invite with a link to access the user interface of Evolute online software with instructions provided to them. There two login option at evolute.fi, a user and admin. Therefore the researcher acquired and used an admin account to view and process the responses. Responses collected were kept confidential and presented in an anonymous way throughout this research.

3.5. Background of Evolute

Tricuspoid 2.0 (competencies of entrepreneurs) tool of Evolute system was used in this thesis to collect empirical data. Evolute system is an online soft-computing-based

technology that supports the management of organizational resources according to the evolute approach. The Evolute system is a computing platform and a technology that computes and visualizes the meaning of the knowledge input collected from stakeholders. The computing in the Evolute system is based on soft-computing methods and algorithms in order to cope with imprecision and uncertainty embedded in natural language and human knowledge inputs. (Kantola 2015). It is important for organization to know the perception of individuals of their own professional competencies in addition to personal will to develop those competencies. (Kantola & Vanharanta 2006).

3.6. Dataset

Dataset for this thesis comprises the data collected through Tricuspoid 2.0 tool. Evolute tool collects the current level, target level and creative tension from the user as input and provides output in various graphical and numerical forms. Various representations of the data collected through Evolute are described in the following sub chapters.

Two datasets are used in this study. The first dataset comprises the results of PhD students of University of Vaasa and the second dataset comprises the results of BSc students of University of Girona. Various comparative research is done by utilizing these two datasets.

3.6.1. Primary Dataset

Primary dataset comprises the group results of the self-assessment which includes competence profile values of 26 PhD students of University of Vaasa.

Primary dataset comprises:

- 33 questions,
- 3 statements per each question,
- 2 data points per each statement.

For one respondent there are: (99 statements) x 2 data points (current and target) = 198 data points.

Total number of data points is 198 x 26 respondends = 5148.

3.6.2. Secondary Dataset

Secondary dataset comprises the group results of the self-assessment which includes competence profile values of 331 BSc students of University of Girona

Secondary dataset comprises:

- 33 questions,
- 3 statements per each question,
- 2 data points per each statement.

For one respondent there are: (99 statements) x 2 data points (current and target) = 198 data points.

Total number of data points is 198 x 331 respondents = 65538.

3.7. Data Analysis Methods

Outputs of datasets provided from Evolute are in forms of graphics, tables and histograms which are already in an easy to understand and directly usable form. These will be used as the main data source for the analysis and comparison. Description of each output will be done and alternative views of outputs will be explained.

In this study comparative analysis will be used to compare Case 1 dataset and Case 2 dataset, and further comments will be made while comparing two datasets. Visual comparison of the datasets will be the main analysis method to be used.

In addition to comparative analysis a semi-structured interview was conducted with University of Vaasa Vice Dean. Transcription of this interview can be found in Appendix 4. Commentary on this interview can be seen in the interview results chapter.

4. RESULTS

In this chapter the results of this study will be demonstrated. Evolute provides individual results and group level results. Individual results refer to a list individual results of all respondents. Group level results (summary) is a representation of a total of all individual results together with graphics by Evolute by computing according to its algorithm based on fuzzy logic. This offers a collective representation of the views of all participants in the group.

Group level results are more suitable and relevant for this study. Therefore group level results will be used throughout the study. Group level results are divided into three classes in Evolute i.e. competencies, competence groups and competence main groups.

Results will include the results for Case 1 and Case 2 separately. For each case the following will be demonstrated:

- Group level results
- Competence group results
- Competence main group results

Group level results refer to entrepreneurial competencies (33 competencies), competence group results refer to competence groups that these competencies fall under (self-control, motivating oneself, cognitive capability, self-knowledge, social skills and empathy), and competence main group results refer to two main competence groups that competence groups classified into i.e. personal competencies and professional competencies.

Results also include for each entrepreneurial competency: current state, future state, and creative tension (Evolute-index) of respondents. Additionally, various different visual representation of the results are presented. Analysis of results of are then demonstrated.

4.1. Group Level Results of Case 1 – University of Vaasa

Case 1 results comprises the group results of 26 PhD students did the self-assessment for this study at University of Vaasa. In the following sub chapters different representations of the results are presented.

4.1.1. Creative Tension of Competencies of Case 1

In figure 1 creative tension is shown for the group of PhD students of University of Vaasa according to Evolute index. The blue bar represents the current level of that competency and the red bar represents the target level for that competency. Target state divided to current state shows creative tension according to Evolute index.

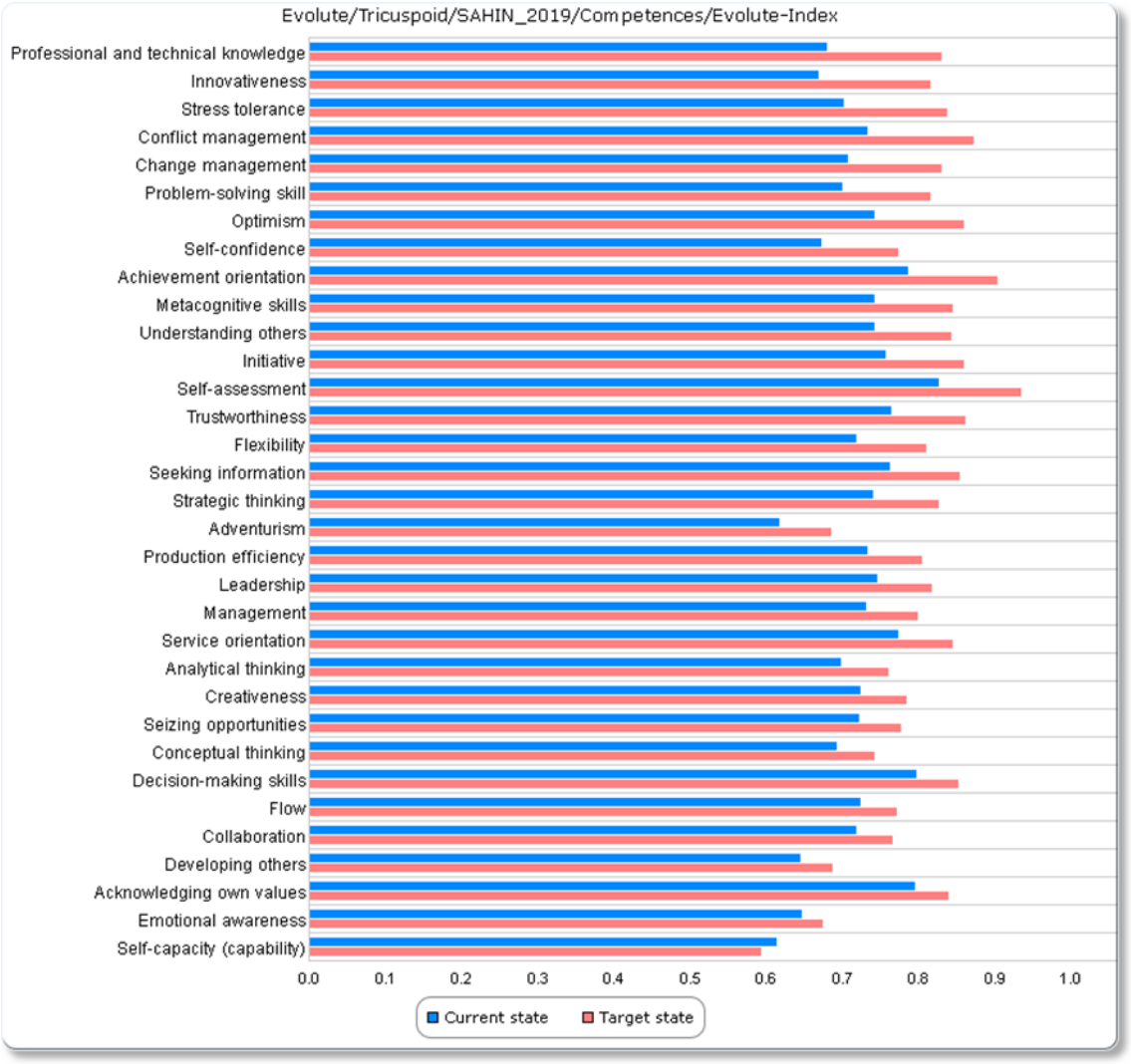


Figure 4. Histogram: Group results of Case 1 – University of Vaasa, Evolute Index.

In histogram view Evolute group level competencies are demonstrated from the highest creative tension, on the top, to the lowest creative tension, on the bottom.

According to the results PhD students of University of Vaasa the group has the highest creative tension in **professional and technical knowledge, innovativeness, stress tolerance, conflict management and change management.**

The students in Case 1 group have the lowest creative tension in **collaboration, developing others, acknowledging own values, emotional awareness and self-**

capacity (capability).

Rest of the values, 23 of 33 competencies, of the Case 1 students are at the relatively mid-range.

Figure 5 shows the "line view" for creative tension. In this view the blue colour line represents the current state of the sample group and the red colour line represents the target state. The green colour area represents the creative tension. This view makes it easier to distinguish which competency has a higher or lower creative tension as well as it makes easy to distinguish which competencies are rated high and low.

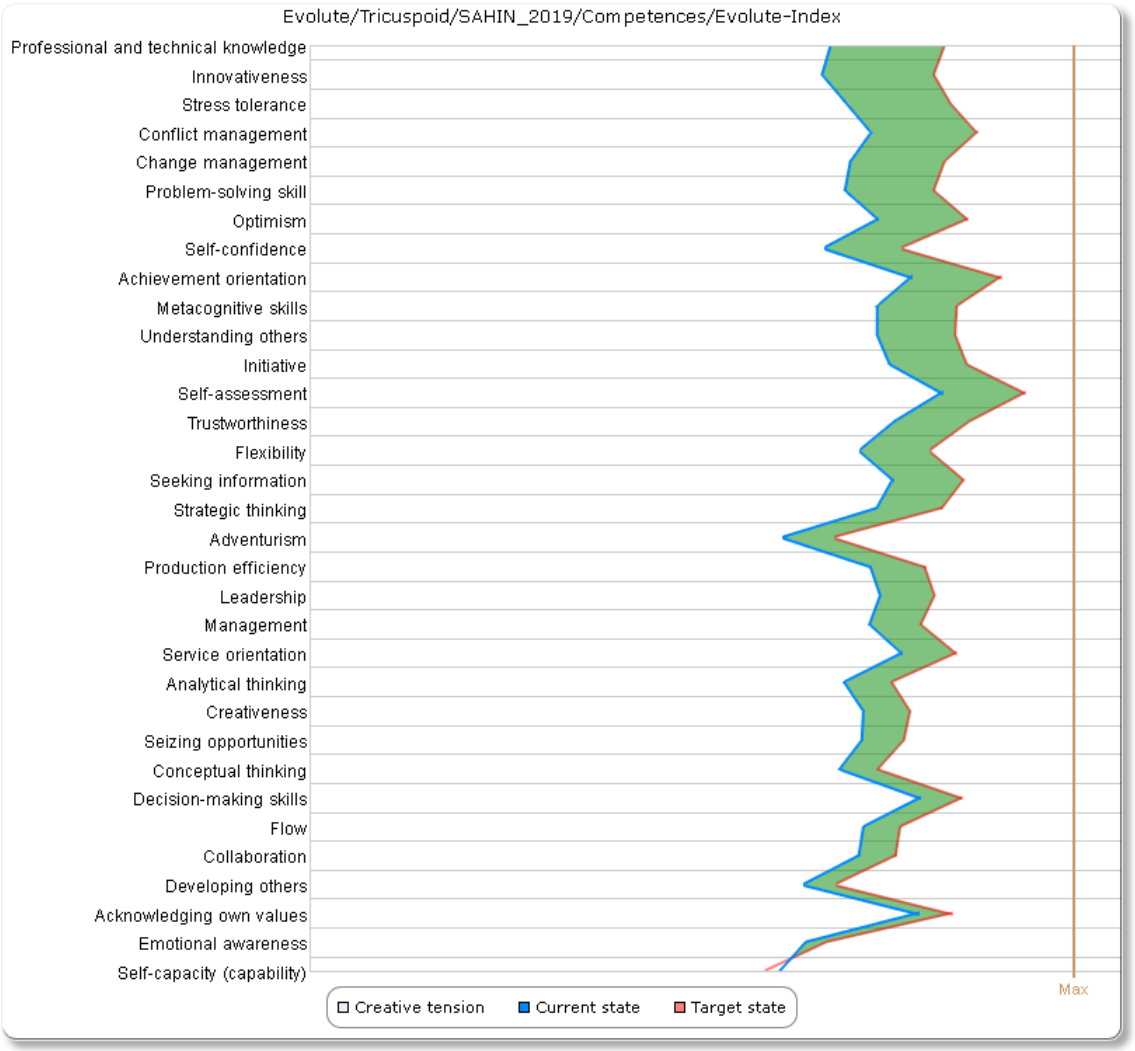


Figure 5. Line view of Creative tension of competencies for Case 1.

It is seen that adventurism and self-capacity(capability) were rated by the students with the lowest current level among all competencies, while self-assessment competency was rated with the highest current level followed by decision-making skills and acknowledging own values at similar levels.

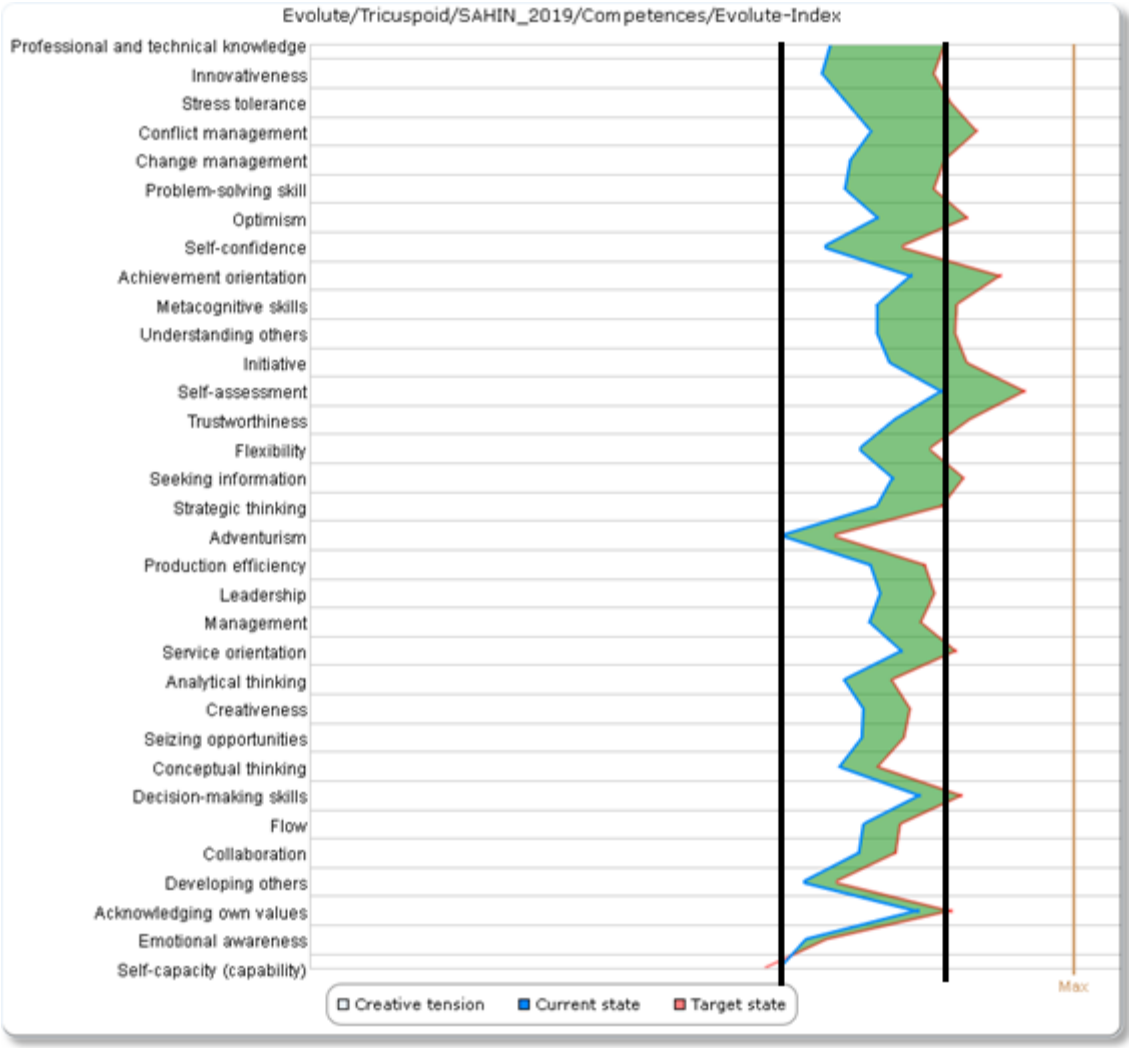


Figure 6. Line view of Creative tension of competencies for Case 1 – with additional vertical lines for lowest and highest current level.

Another view for the results of Evolute group level results is web view. This view offers a more holistic view of all competencies. Figure 6 shows web view of creative tension of competencies of the Case 1.

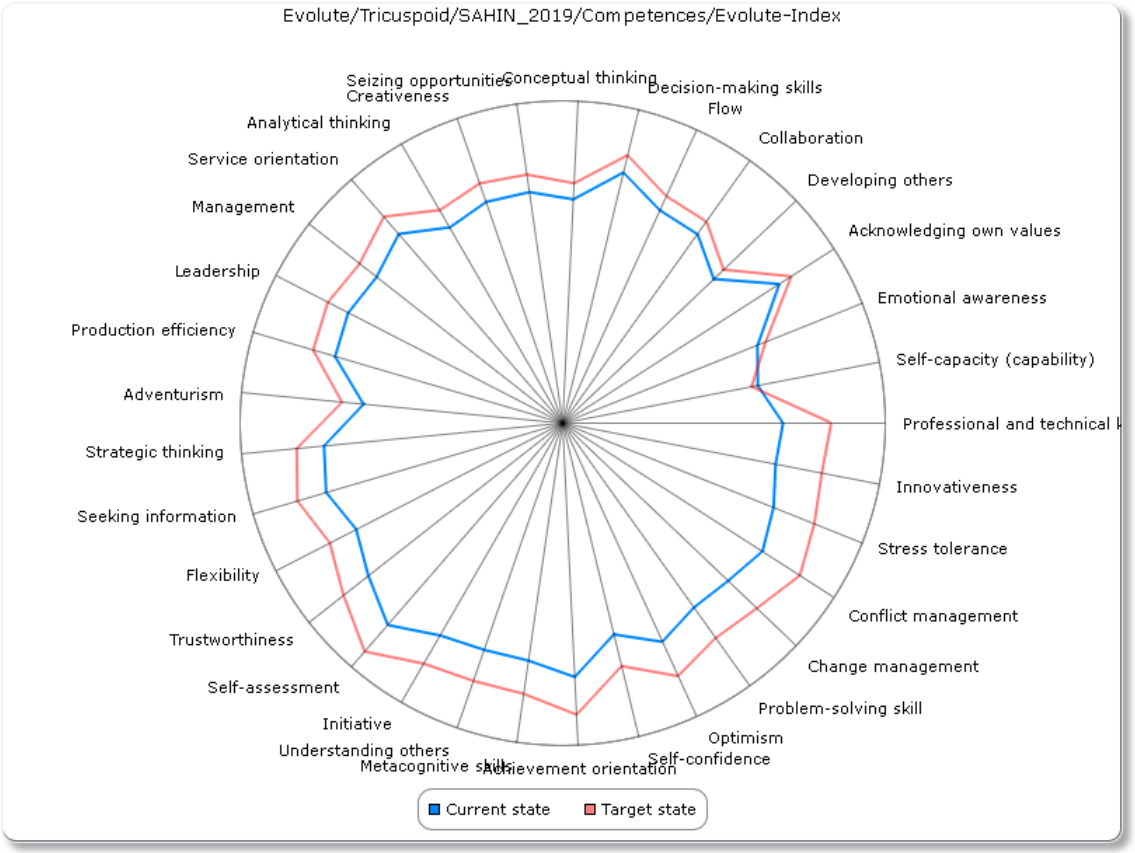


Figure 7. Web view of creative tension of competencies of the Case 1.

4.1.2. Creative Tension Competence Groups Results for Case 1

Competence groups results for Case 1 shows the results according to competence groups

which were previously mentioned in Table 1. Competence groups are cognitive capacity, self-control, empathy, social skills, self-knowledge and motivating oneself. Figure 7 below shows competence groups results for Case 1.

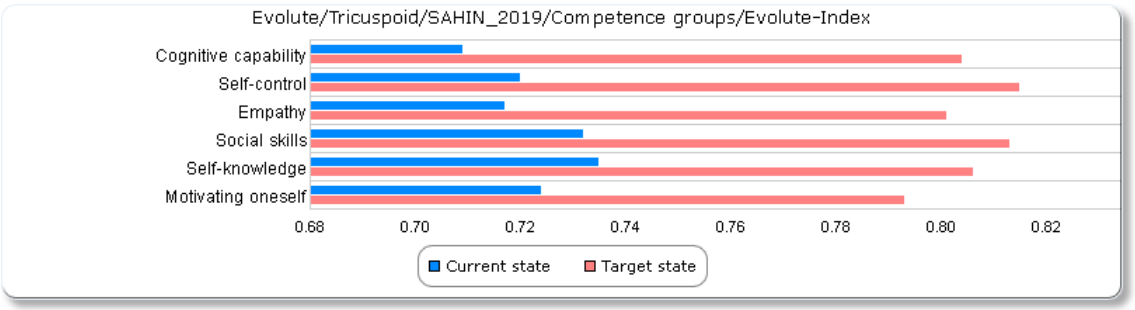


Figure 8. Histogram: Competence groups results for Case 1.

It is seen that Case 1 has the highest creative tension in **cognitive capability** and lowest creative tension in **motivating oneself.**

In addition to histogram, other two representations for the competence group results is line view and web view. Figure 8 shows line view of competence groups results for Case 1.

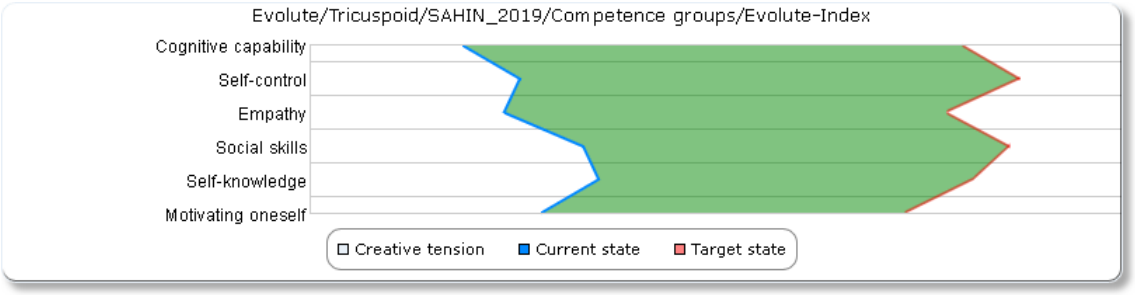


Figure 9. Line View: Competence groups results for Case 1.

In line view it is seen that **cognitive capability** has the lowest current level and **self-knowledge** has the highest current level in Case 1.

In Figure 9, web view is shown. As we see web view for Case 1 results provide a relatively symmetric view which does not provide much insight for the viewer.

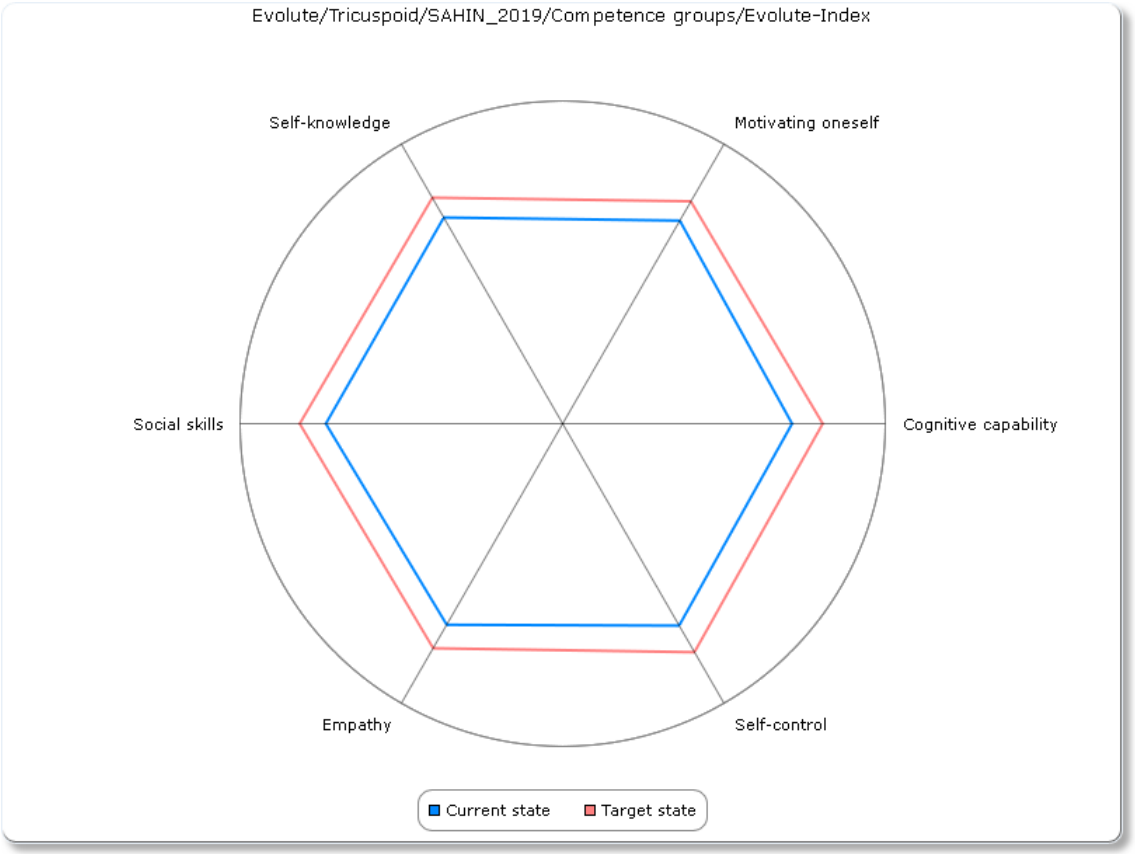


Figure 10. Web view: Competence groups results.

4.1.3. Creative Tension of Competence Main Groups Results for Case 1

Main group results categorizes all competences into two categories: personal competencies and social competencies. Figure 11 shows the main group results for Case 1.

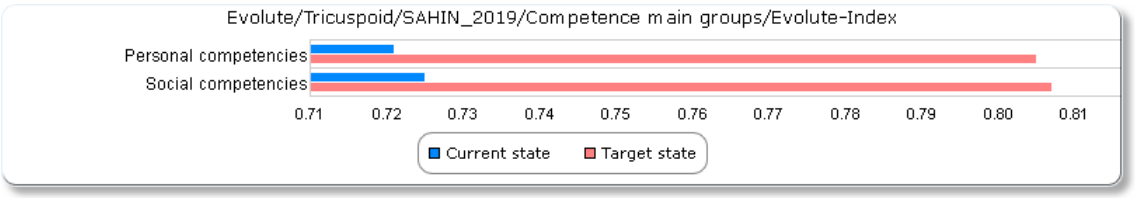


Figure 11. Histogram: Competence main groups.

In figure 10 it is seen that Case 1 evaluated their current level of social competencies slightly higher than the the current level of personal competencies. Similarly target level for the social competencies are slightly higher than target state of personal competencies for Case 1.

Creative tension of personal competencies is slightly higher than the creative tension of the social competencies for Case 1.

Line view of competence main groups for Case 1 can be seen below in figure 12.

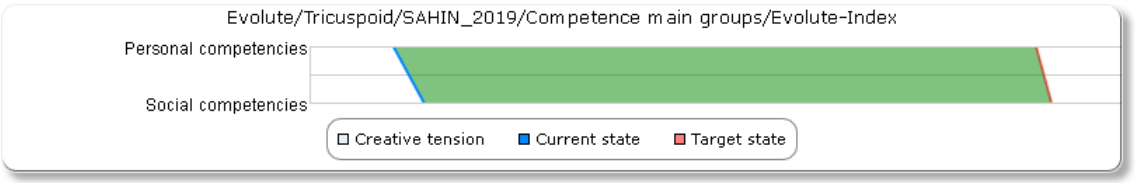


Figure 12. Line view of competence main groups for Case 1.

We do not see a significant difference for creative tension of personal competencies and social competencies of Case 1.

Web view of competence main groups for Case 1 can be seen below in figure 13.

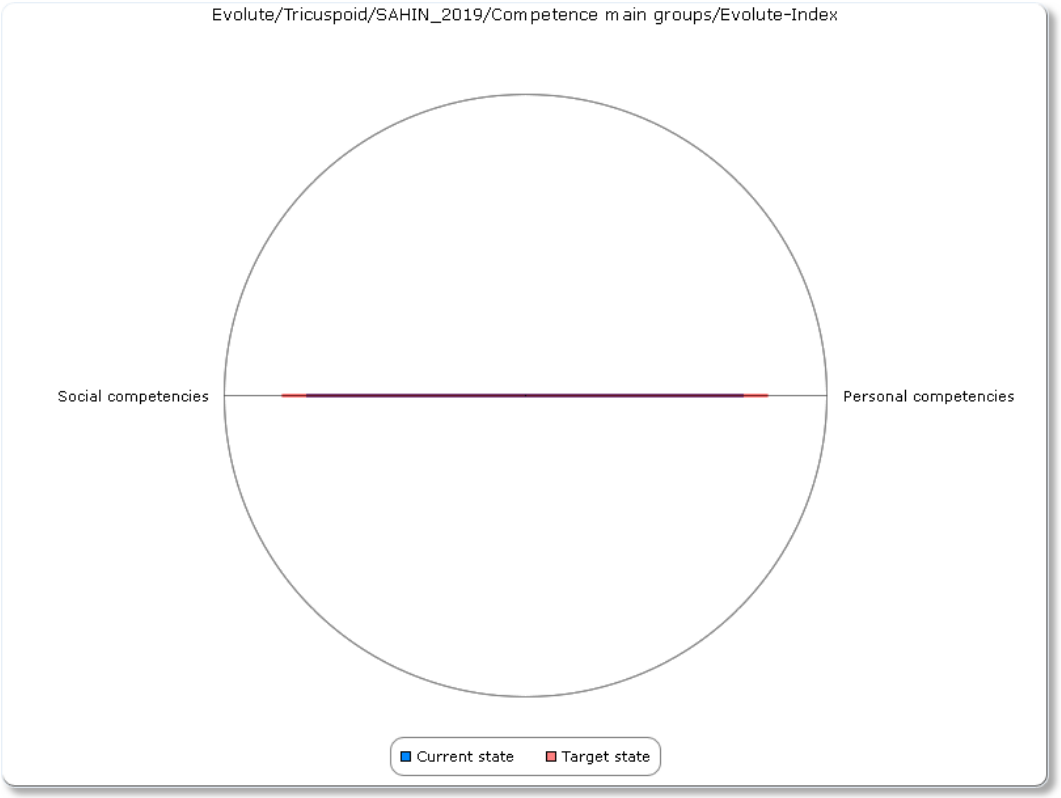


Figure 13. Web view of competence main groups for Case 1.

As we see in figure 12 web view for Case 1 results provide a relatively symmetric view and does not provide much insight for the viewer.

4.2. Group Results of Case 2 – University of Girona

In university of Girona case 331 BSc students responded to the self-assessment for this study. In following sub-chapters different representations of the results are presented for Case 2.

4.2.1. Creative Tension of Competencies of Case 2

In figure 14 creative tension is shown for the group of 331 BSc students of Girona University according to Evolute index.

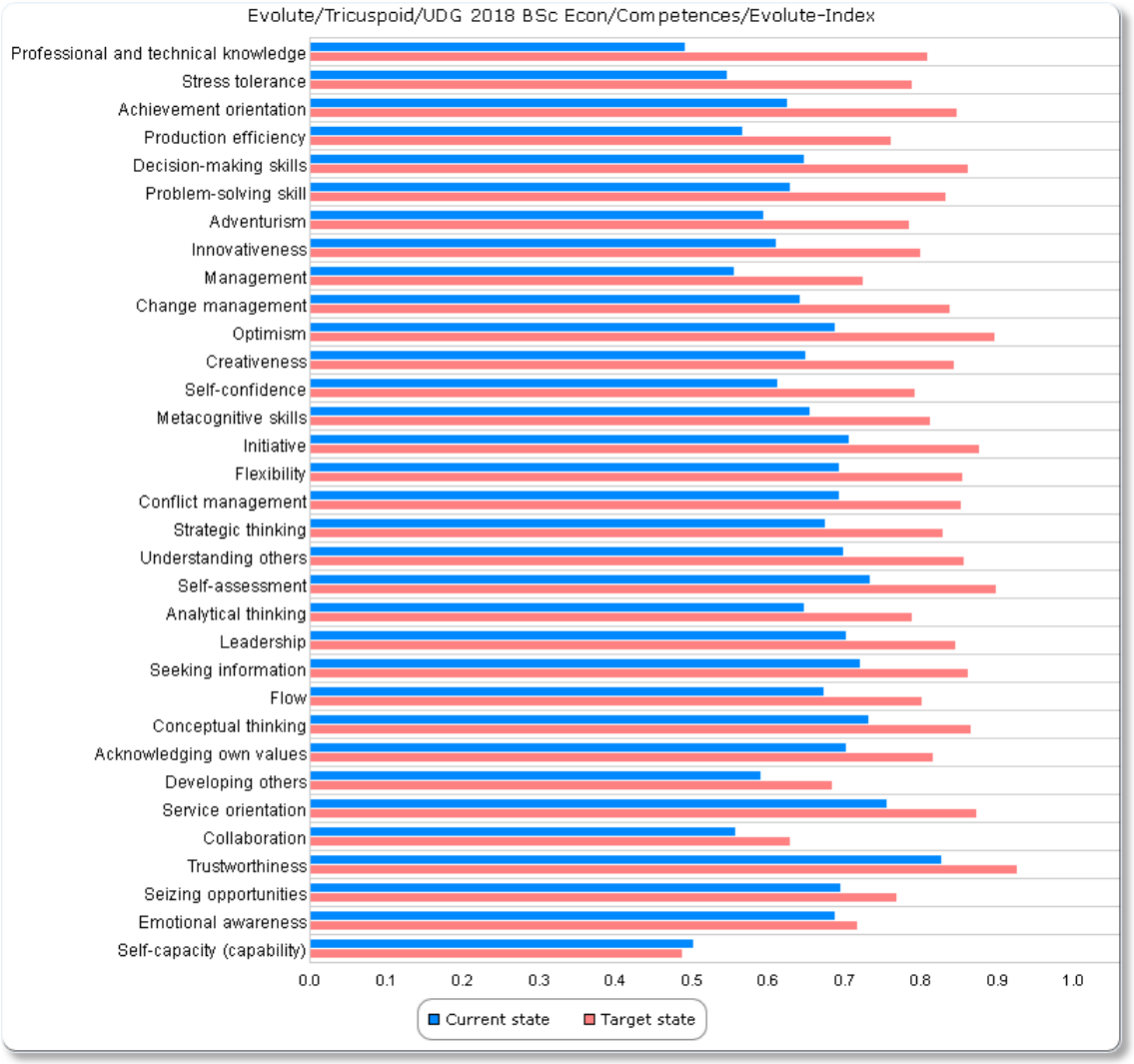


Figure 14. Histogram: Group results of Case 2 – University of Girona, Evolute Index.

According to the results, BSc students of University of Girona has the highest creative tension in **professional and technical knowledge, stress tolerance, achievement orientation, production efficiency and decision making skills.**

The students in Case 2 have the lowest creative tension in **collaboration, trustworthiness, seizing opportunities, emotional awareness and self-capacity (capability).**

Rest of the 23 out of 33 values of creative tension of students are in the relatively mid-range. In figure 15 line view of Creative tension of competencies of Case 2 is presented.

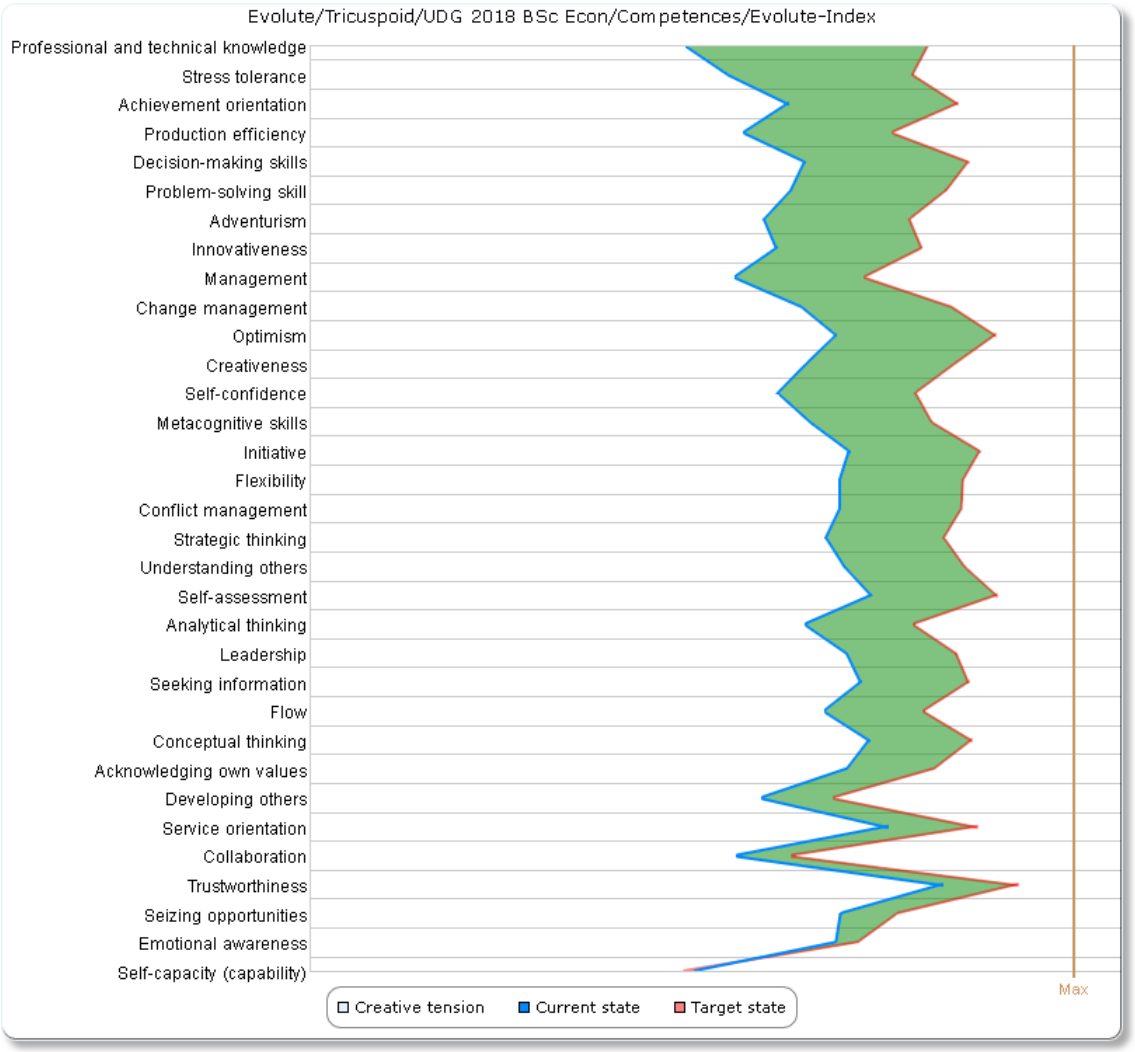


Figure 15. Line view of Creative tension of competencies of Case 2.

Below in figure 16 line line view of Creative tension of competencies of Case 2 with

additional vertical lines is presented. This makes it easier to see the competencies with lowest and highest current perceived level.

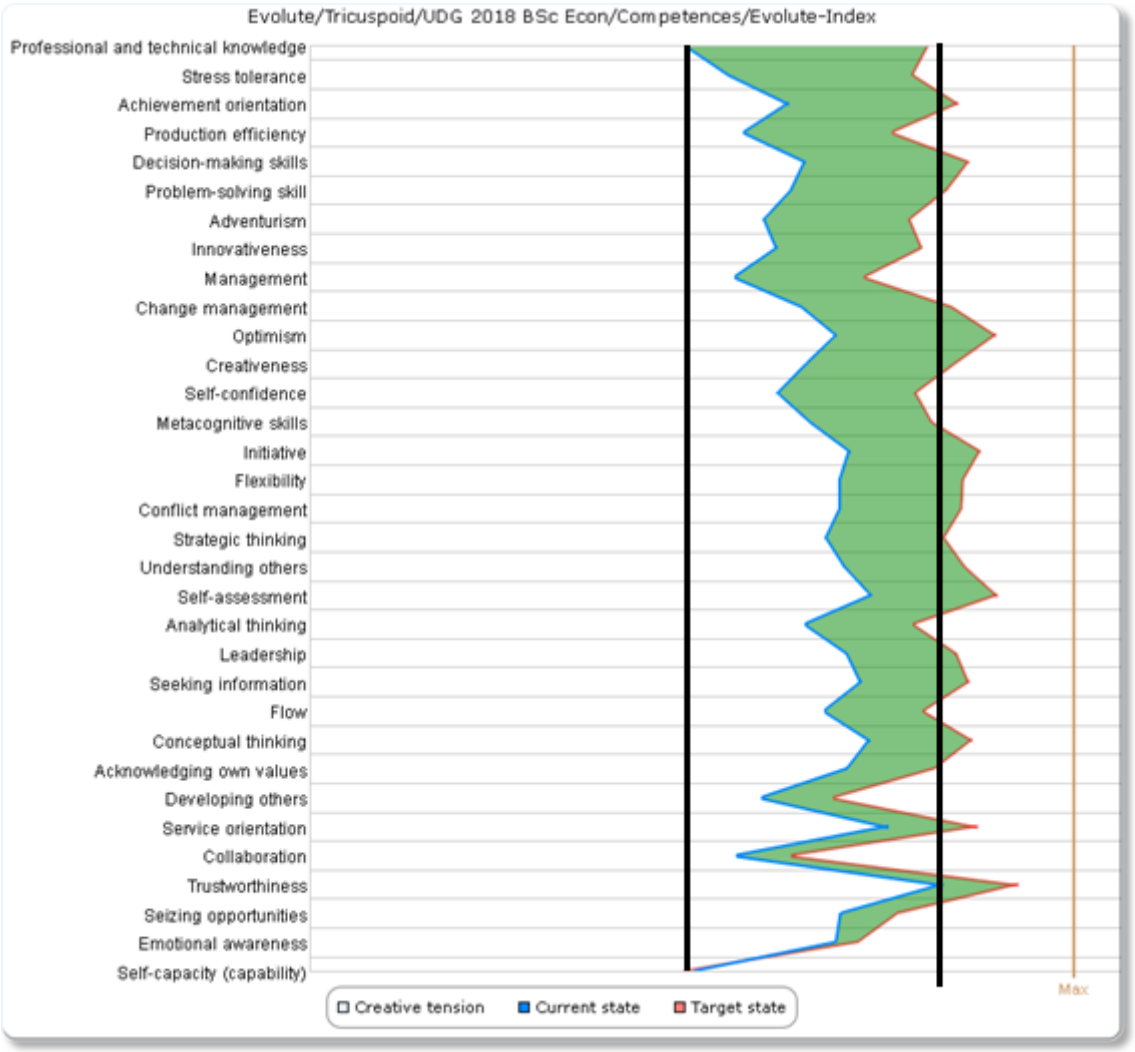


Figure 16. Line view of Creative tension of competencies of the Case 1 – with additional vertical lines for lowest and highest current level.

Figure 16 shows that Case 2 students rated their level at professional and technical knowledge as the lowest of their competencies. The students in Case 2 rated trustworthiness as the competency they have highest level followed by service orientation.

4.2.2. Creative Tension Competence Groups Results for Case 2

Figure 7 below shows competence groups results for Case 2.

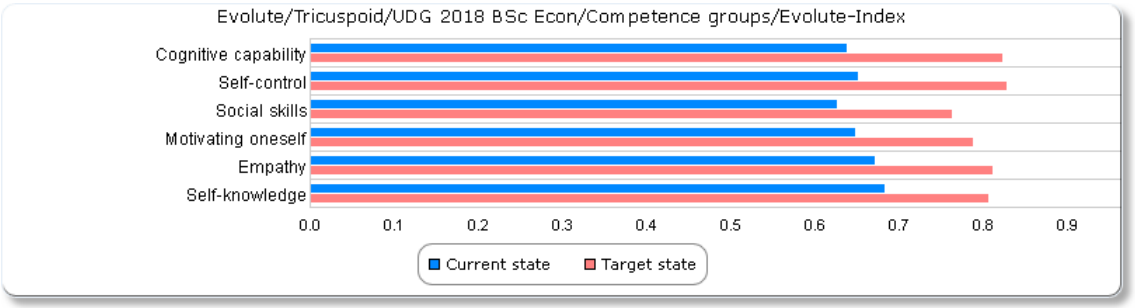


Figure 17. Histogram: Competence groups results for Case 2.

It is seen that Case 2 has the highest creative tension in cognitive capability and lowest creative tension in self-knowledge. Figure 18 shows line view of competence groups results for Case 2.

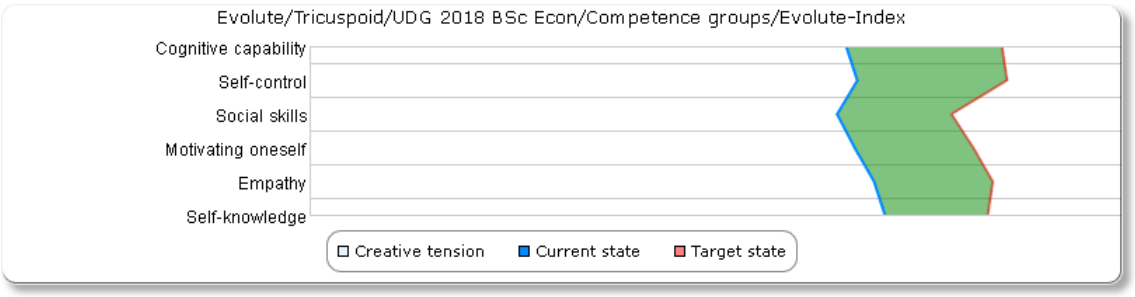


Figure 18. Line View: Competence groups results for Case 2.

Line view of the results show that social skills was rated with the lowest current level and self-knowledge was rated with the highest current level in Case 2.

4.2.3. Creative Tension Competence Main Groups Results for Case 2

In figure 19 it is seen that Case 2 evaluated their current level of social competencies and current level of personal competencies at very similar levels. It is seen that Case 2 rated target level for the personal competencies slightly higher than target state of social competencies.

Creative tension of personal competencies is slightly higher than the creative tension of the social competencies for Case 2

Line view of competence main groups for Case 2 can be seen below in figure 19.

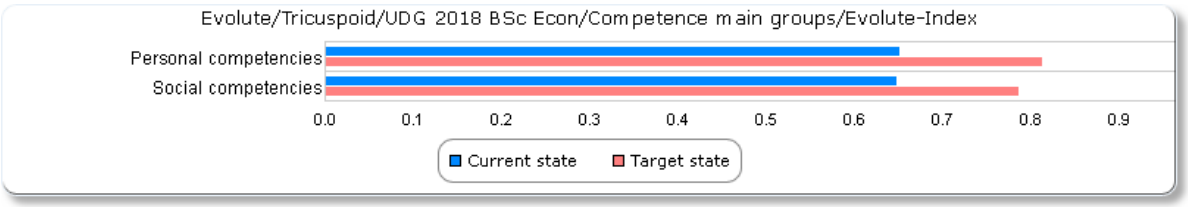


Figure 19. Histogram: Competence main groups for Case 2.

In figure 20 it is seen that Case 1 evaluated their current level of social competencies slightly higher than the the current level of personal competencies. Similarly target level for the social competencies are slightly higher than target state of personal competencies for case 1.

Creative tension of personal competencies is slightly higher than the creative tension of the social competencies for Case 1.

Line view of competence main groups for Case 2 can be seen below in figure 20.

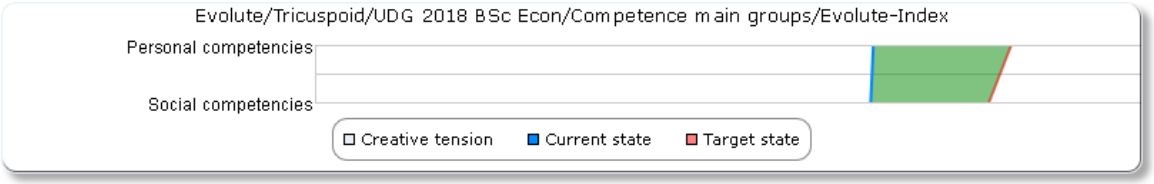


Figure 20. Line view: Competence main groups for Case 2.

In figure 20 we 2 we do not see a significant difference for the current level of personal and current level of social competencies for Case 2. However students rated a higher desirable level for personal competencies. Therefore we see that personal competencies

have higher creative tension than social competencies for Case 2.

4.3. Comparison of Results of Case 1 and Case 2

4.3.1. Comparison of Competencies Group Results

In Table 2 top five competencies for Case 1 and Case 2 can be seen from the highest on top (number 1) to the lowest on the bottom (number 5).

Table 2: Top Five Competencies in Each Group According to Creative Tension.

University of Vaasa (Case 1)	**University of Girona (Case 2)**
1. Professional and technical knowledge	**1. Professional and technical knowledge**
2. Innovativeness	**2. Stress tolerance**
3. Stress tolerance	3. Achievement orientation
4. Conflict management	4. Production efficiency
5. Change management	5. Decision-making skills

It is seen in Table 2 that professional and technical knowledge has the highest creative tension for both cases. This means that students at both University of Vaasa and University of Girona wish to develop "professional and technical knowledge" at most. We see that "stress tolerance" is another common trait that students from both cases wish

to develop that at the second highest creative tension level for University of Girona and third highest creative tension level for University of Vaasa. In top 3 results for University of Vaasa and University of Girona we see that innovativeness has the second highest creative tension for University of Vaasa and achievement orientation has the third highest creative tension for University of Girona.

4.3.2. Comparison of Competence Groups Results

Figure 21 shows the competence groups results of case 1 and case 2 together.

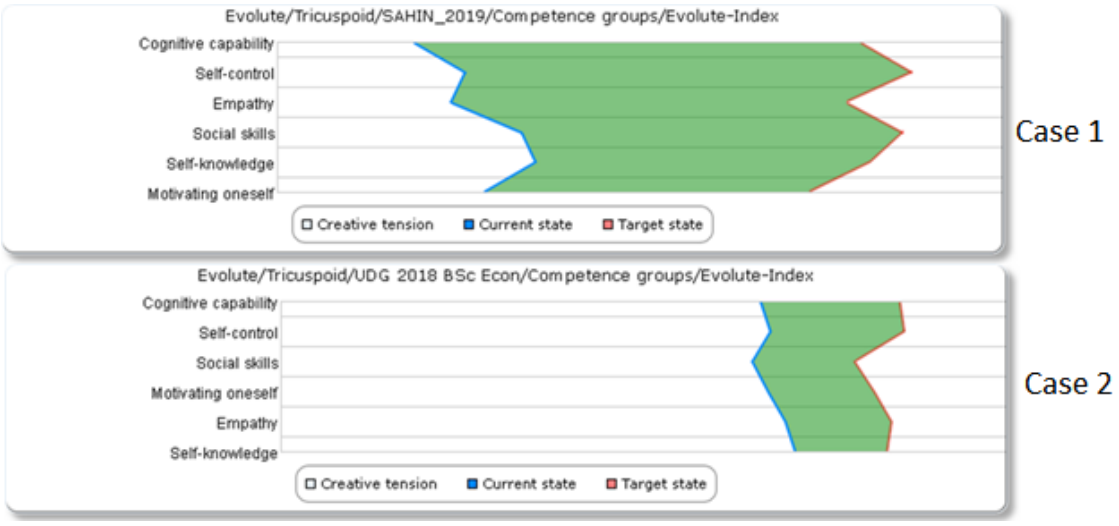


Figure 21. Competence Groups Results of Case 1 and Case 2.

From a visual overview there are noticable differences between two groups. University of Girona (Case 1) students rated their current perceived state in all six assessed

competence groups higher than the University of Vaasa (Case 2) students. Target state of two groups are not largely different.

There are similarities and differences between the cases. Initially we see that cognitive capacity and self-control are top two competence groups with the highest creative tension for both cases.

It is seen that creative tension of University of Vaasa students in all competence groups is significantly higher than the create tension of University of Girona students. This is due to University of Vaasa students' lower rating of current level for all competencies (or University Girona students' higher rating for all competencies).

4.3.3. Comparison of Competence Main Groups Results

Difference ratings can be seen among competency ratings of Case 1 and Case 2 however when it comes to main group results both Case 1 and Case 2 have personal competencies with higher creative tension than social competencies which means that students wish to develop personal competencies more than social competencies.

4.4. Data Collection Process and Challenges

Self-evaluation method that is used in this thesis consists of 99 questions with three fuzzy scale for each question to choose one's level for each competency. Even though it resembles a regular questionnaire it required an active effort to reach respondents, guide and encourage them to answer it. This was mostly due to the time that data collection required. Due to the fact that Tricuspoid comprises 99 questions, it required more time of participants to answer compared to a regular survey. They mentioned this as a difficulty.

Communication methods to reach respondents were email, telephone and direct visits. An email invitation was sent initially which was enough for some respondents since they required more guidance. They were guided through phone or in person.

Other than a difference from a typical multi-choice survey, Evolute required users to first register an account, confirm it through email and then login and answer the questions. This initial step was perceived as time consuming from some participants.

Some of the feedback from participants were the following:

- *"It is not not like a typical survey and there are many extra steps.".* Referring to registration and login requirement.
- *"It is way too time consuming and there are too many steps to do."* Referring to registration and login requirement and time requirement to answer questions.
- *"Way too much work. A direct link for participants to click to directly start answering would increase total participation."* Referring to registration and login requirement and time requirement to answer questions.

After an active guidance majority of the participants were able to complete the data collection successfully and see their results. Most of the participants found their results interesting. They found the graphical output interesting as well and easy to understand. Some participants said that the results provided them a different perceptive about their self they did not notice before.

4.5. Interview Results

A semi-structured interview was conducted for this research as an additional method to collect empirical data. Then interviewee was the vice dean of University of Vaasa. Interview questions and transcription of the responses are the following:

Question 1: What is the state of competencies that PhD students of University of Vaasa for entrepreneurship? Do you think this is an important area to improve and what can be done to make them potential, successful entrepreneurs?

Response 1: *I think there is a big variety between the students in various skills. It depends on each student and his or her background. Situation of each student is different. It depends on what previous studies each student had done. For instance we have students which had done their master studies in business area came from other universities. Currently we do not have courses for every interest. Because of that if a student wants to have such a course then he or she has to do it at a different university.*

Question 2: What are the plans of University of Vaasa for PhD students to gain new competencies and improve the current competencies? (if any, which areas?)

Response 2: *Now that we are renewing our doctoral school currently we are trying to figure out what are those competencies needed nowadays and what we should offer here. It is also a responsibility of the students. Professors should evaluate what are the needs of each student specifically. So that he or she can plan the student's way. We are really flexible in this. If a student is interested in entrepreneurship then the supervisor can guide him or her to those kind of courses more about those competencies.*

Question 3: What kind of efforts have been done till this day for PhD students to gain new skills or improve current skills? (if any, which areas).

Response 3: *We have already had some courses based on the work that have been done throughout the years. Twice a year, every spring and autumn semester, we go through our courses as the management team and discuss if we have the right courses needed and if anything needs to be added to curriculum.*

Question 4: What areas of competencies should be focused most to improve in future?

Response 4: *It is important that our doctoral students have the researcher skills but in the future they will also need other skills i.e. softer skills. It has been being discussed about continuous learning with which students can learn ways to improve their competencies in soft skills e.g. communication, how to develop yourself, career planning.*

Results of this thesis will provide insights on requirements of the faculty for future educational planning.

5. DISCUSSION AND RECOMMENDATIONS

This chapter will discuss about the results, offer explanations and suggest development recommendations. Creative tension will be at focus since it shows the competencies that students wish to develop the most. Competencies with higher creative tension offer a high development potential. In addition, notable similarities and differences between two cases will also be described and discussed in this chapter.

It is seen in the results that PhD students of University of Vaasa have the highest creative tension in professional and technical knowledge, innovativeness and stress tolerance. On the other hand, BSc students of University of Girona have the highest creative tension in professional and technical knowledge, stress tolerance and achievement orientation.

Professional and technical knowledge competency is essential for university students at any study level. In addition this competency is also highly relevant to entrepreneurial success. Entrepreneurs that have high amount of professional and technical knowledge in their domain perform better compared to others. They also bring their organization ahead of competition. Therefore it is understandable that there is a desire to improve this competency. Vice Dean of University of Vaasa during the interview highlighted the desire to improve technical and professional (researcher skills) of the PhD students at university of Vaasa. This compliments the self-evaluation results of University of Vaasa PhD students regarding professional and technical knowledge.

According to Spencer et al. (1993) technical, professional and managerial expertise comprises job related technical, professional or managerial mastery at one's job, motivation to improve this knowledge and distribute this knowledge to others. He further mentions that acquisition of expertise is a special case of information seeking and a step before distribution of expertise. Information seeking requires curiosity of the subject or things at the beginning so that leads to further research on it. Analytical thinking and conceptual thinking are supportive competencies to acquisition and distribution of expertise in the cases when technical expertise is complex. Motivation is required for acquisition, maintaining up to date and distribution of technical knowledge and

transferring it into organizational results (Spencer et al. 1993). University of Vaasa can support their students with up-to-date resources, and interesting and relevant courses where they can acquire technical and professional knowledge.

Innovativeness is the competency with second highest creative tension for PhD students of University of Vaasa. Innovative people embrace new ideas, things and information more than others. Innovation involves experimentation and creativity. Entrepreneurship often involves a type of innovation in its business model. In order to flourish innovativeness in its study environment University of Vaasa management can allow more freedom for their PhD students to work on the topics they desire and develop new ideas. Creating places and platforms where researchers can share knowledge can also be useful for promoting innovativeness by exchanging ideas and lead similar minded people to create new ideas and businesses.

Stress tolerance is the competency with third highest creative tension for University of Vaasa PhD students. Stress tolerance is required both in academic environment and entrepreneurial processes. Interestingly it is also the competency with second highest creative tension for University of Girona BSc students. It is seen that students at both institutions seek ways to manage stress and be more tolerant to it. Academic work and studies are stressful at many levels. Performance expectations externally or personally, keeping up with the schedules, and requirement to interact with variety of high number of different people can be stressful to some students. Offering educational psychological support more widespread to students and offering courses to all PhD students that promotes psychological wellbeing can help with development of stress tolerance competency. Top three competencies with the highest creative tension for University of Vaasa PhD students were in the personal competencies category.

Social skills are important in many areas of life including educational environment as well as work environment. Conflict management and change management were in top five competencies with highest creative tension for PhD students of University of Vaasa. Conflict management is the ability to negotiate and resolve disagreements between people. People that are good at this skill are seeking and finding win-win solutions for both parties. Change management is crucial in highly changing environments. Some

examples to this are entrepreneurial scene and universities where academics require to keep up with the emerging science and teach new subjects. Change management requires active involvement and leadership from the organization that change takes place.

Conflict management and change management are in social competencies category. Considering it was mentioned in the interview with Vice Dean that University of Vaasa wishes to develop soft skills (social skills) of PhD students, focusing on these social competencies could be a right choice for university as a start for targeted competency improvement for students. Optional courses that focus on soft skills can be useful for improving these skills.

6. THEORETICAL AND PRACTICAL IMPLICATIONS

6.1. Theoretical Implications

This study has various theoretical and practical implications. Firstly it supplements the research on Evolute by filling the gap of lack of studies conducted in the field of competencies of entrepreneurs. In the management field, human resources field and psychology field there has been considerable amount of research on competencies and competence models however there were rather small number of research available on entrepreneurship and competencies together. Additionally there is little amount of research available on competency assessment and development on university students. Theoretical findings of this research can lead to further interest in entrepreneurial competencies, university students and competency development.

6.2. Practical Implications

Empirical findings of this thesis clarified the current and target level of entrepreneurial competencies of the PhD students of University of Vaasa. The practical implication of this study will contribute in future plans and strategy development in academic educational field by providing better understanding of skills and competencies of students and which of these competencies to focus for development. This will enable more specific and targeted planning and lead to enhancement in organizational performance as well.

7. CONCLUSIONS

This study analysed the competencies of 26 PhD students and 331 BSc students from University of Girona by using Evolute tool Tricuspoid 2.0. Sample groups were chosen from two different universities and assessed for their entrepreneurial competencies by using a self-assessment method.

The first research question was addressed in theoretical framework chapter. In this chapter findings from theoretical research are presented. Entrepreneurship, competence models, self-assessment, and competencies for entrepreneurship are defined and described in detail in this chapter. It was emphasized by the researchers that entrepreneurship requires certain competencies that differs it from a regular business practice. Improvement of the entrepreneurial competencies to enhance the skills of potential entrepreneurs is coming from this finding.

Research methodology and results chapters address the research questions two and three. Firstly the research design is presented. Then the research method, application of it and primary and secondary datasets are defined and presented in detail. Results chapter presents the state of competencies of PhD students of University of Vaasa for entrepreneurship in terms of current state, aimed future state and creative tension. In addition the results for University of Girona are presented. Interpretation of the results are done and University of Vaasa results are compared with University of Girona results in this chapter.

Chapter five discusses about the results and offers recommendation based on needs of University of Vaasa PhD students and University of Vaasa management. Creative tension is a good indicator for the decision makers when it come to choose which competencies to focus for improvement. Creative tension for each competency is obtained directly from the self-assessment results of the respondents. Professional and technical knowledge, innovativeness and tress tolerance were the competencies with the highest creative tension for University of Vaasa PhD students. These are the competencies that students desire to improve the most. It is worth mentioning that professional and technical

knowledge and stress tolerance were also the top two competencies with highest creative tension for University of Girona BSc students. Even though the countries were different and study levels were different these two competencies were needed from both student groups. It can be seen normal because professional and technical knowledge and stress tolerance is needed throughout the educational life as well as the work life and independent of the geography.

Chapter six presents the theoretical and practical implications of the study. Theoretical implications were mainly on enhancing the research on entrepreneurship, Evolute and competency models. Practical implications were the recommendations presented to University of Vaasa management.

Results of this study provides insight on entrepreneurial competencies of PhD students of University of Vaasa. This study provided development areas to be focused on for students' development in an educational organization.

When the results were analysed author recognized overall differences between the ratings of current level of the competencies between two cases. It would be worth exploring reasons behind differences among two datasets regarding current state ratings as well as creative tension. One further suggestion for future research can be to conduct interviews with the participants themselves and comparing their views with the results from Tricuspoid 2.0. This can lead to future development of new iterations of entrepreneurial competency models. Future research can investigate different student groups i.e. by using different size of datasets at the same study level or different study level of students at other universities. Future studies would contribute to the research area and validate this research.

LIST OF REFERENCES

Aldrich, H. (2000), Entrepreneurial Strategies in New Organizational Populations. In: R. Swedberg (ed.), *Entrepreneurship: The Social Science View*. Oxford: University Press, 211–228

Alic, J. A. (1993). Technical knowledge and technology diffusion: new issues for US government policy. *Technology Analysis & Strategic Management*, 5:4, 369–384.

Alloy, L. B., L.Y. Abramson, W.G. Whitehouse, M.E. Hogan, C. Panzarella & D. T. Rose (2006). Prospective incidence of first onsets and recurrences of depression in individuals at high and low cognitive risk for depression. *Journal of Abnormal Psychology*, 115, 145−156.

Amason, A. C. (1996). Distinguishing the effects of functional and dysfunctional conflict on strategic decision making: resolving a paradox for top management teams. *Academy of ManagementJournal*,39, 123–48.

Anderson, A. & S. Jack (2002). The Effects of Embeddedness on the Entrepreneurial Process. *Journal of Business Venturing.* 17. 467-487.

Anderson, P.M. & P.M. Anderson (1995). *Analysis of faulted power systems.* vol. 445. New York: IEEE press.

Ansoff, H.I. (1965*). Corporate Strategy: An Analytic Approach to Business Policy for Growth and Expansion*. New York: Praeger. 139 p.

Bantel, K. A. & S.E. Jackson (1989). Top management and innovations in banking: does the composition of the top team make a difference? *Strategic Management Journal*,10, 107–12.

Bar-On, R. (2000). Emotional and social intelligence: Insights from the Emotional Quotient Inventory. In R. Bar-On & J. D. A. Parker (Eds.), *The handbook of emotional intelligence: Theory, development, assessment, and application at home*, school, and in the workplace, 363-388. San Francisco, CA: Jossey-Bass.

Benabou, R. & J. Tirole (2002). Self-Confidence And Personal Motivation. *The Quarterly Journal of Economics* 117:3, 871-915.

Bhatia, V.K. (2004). Worlds of written discourse: A genre-based view. *Continuum.*

Boyatzis, R. (1982). *The competent manager.* New York: John Wiley & Sons. 308p.

Boyatzis, R. E. & D.C. Mcclelland (1980). Opportunities for Counselors from the Competency Assessment Movement. *The Personnel and Guidance Journal* 58: 368-372.

Brandell, J.R. (1997). *Theory and Practice in Clinical Social Work*. New York: Simon and Schuster. 189 p. ISBN 978-0-684-82765-0.

Bray, D. W., R.J. Campbell & D. L. Grant (1974*). Formative years in business: A long-term AT&T study of managerial lives.* New York: Wiley-Interscience.

Burki A. & D. Terrell (1998). Measuring production efficiency of small firms in Pakistan. *World Development* 26:1, 155-169.

Carnevale, D. G. & B. Weschler (1992). Trust in the public sector: Individual and organizational determinants. *Administration and Society*, 23:4, 471-494.

Carver, C.S. (2014). Self-control and optimism are distinct and complementary strengths. *Personality and Individual Differences*, 66, 24–26.

Chang, Y., T. Eklund, J.I. Kantola & H. Vanharanta (2009). International Creative Tension Study of University Students in South Korea and Finland. *Human Factors and Ergonomics in Manufacturing*, 19:6, 528–543.

Cherniss, C. & R. Caplan (2001). A Case Study in Implementing Emotional Intelligence Programs in Organizations. *Journal of Organizational Excellence*. 21. 73 - 85. 10.1002/npr.1121.

Chin, R. (2015). Examining teamwork and leadership in the fields of public administration, leadership, and management. *Team Performance Management*. 21:3/4, 199–216.

Chouhan, V.S. & S. Srivastava (2014). Understanding Competencies and Competency Modeling— A Literature Survey. *Journal of Business and Management*, 16:1, 14-22.

Conger, M. (2012). The role of personal values in social entrepreneurship. Patterns in Social Entrepreneurship Research. Cheltenham: Edward Elgar Publishing. 87 p.

Cooke, F. L., G. Hebson & M. Carroll (2005). Organizational commitment, identity and loyalty. In M. Marchington, D. Grimshaw, J. Rubery, & H. Willmott (Eds.), Fragmenting work: Blurring boundaries and disordering hierarchies (pp. 179–198). Oxford, UK: Oxford University Press.

Cosier, R. A. (1978). The effects of three potential aids for making strategic decisions on prediction accuracy. *Organizational Behavior and Human Performance,*22, 295–306.

Csikszentmihalyi, M. (1990). *Flow : the psychology of optimal experience.* New York : Harper & Row.

Csikszentmihalyi, M. (1998). *Finding Flow: The Psychology of Engagement With Everyday Life*. New York: Basic Books. 181 p.

De Dreu, C. & E. Van de Vliert (Eds.) (1997).Using Conflict in Organizations. Beverly Hills, CA: Sage.

Deacon, B. (1983). *Social Policy and Socialism.* London: Pluto Press. 307 p.

Deutsch, K., M. In Dierkes, H. Weiler & A. Antal (1987). *Comparative Policy Research: Learning from experience.* London: Gower. 400 p. ISBN 978-0-566-05196-8.

Eisenhardt, K. M. & L.J. Bourgeois, L. J. (1988). Politics of strategic decision making in high-velocity environments: toward a midrange theory. *Academy of Management Journal*, 31,737–70.

Ekvall, G. (1996). Organizational climate for creativity and innovation. *European Journal of Work and Organizational Psychology*, 5:1, 105-123.

Ellicott, A., C. Hammen, M. Gitlin, G. Brown & K. Jamison (1990). Life events and the course of bipolar disorder. *American Journal of Psychiatry*, 147, 1194-1198.

Esping-Andersen, G. (1990). *The Three Worlds of Welfare Capitalism.* Princeton: Princeton University Press. 260 p. ISBN 978-0-691-02857-6.

Evolute.fi (2019). *Targeted resource development* [online]. Vaasa: Evolute.fi [cited 20 October 2019]. Available from World Wide Web: <URL:https://www.evolute.fi>.

Finlay-Jones, R.A. & G.W. Brown (1981). Types of stressful life event and the onset of anxiety and depressive disorders. *Psychological Medicine*, 11, S03-8\5.

Flavell, J. (1978). Metacognitive development in J. M. Scandura & C. J. Brainerd (eds.), *Structural / process theories of complex, Alphen a.d. Rijin*, The Netherlands: Sijthoff and Noorddhoff.

Flavell, J. (1979). Metacognition and cognitive monitoring: A new area of cognitive developmental inquiry. *American Psychologist,* 34, 906–911.

Flavell, J. (1987). Speculations about the nature and development of metacognition. In F.E. Weinert & R.H. Kluwe (Eds.), *Metacognition, motivation, and understanding* (pp. 21–29). Hillside, NJ: Erlbaum.

Fraser, S. W. & T. Greenhalgh (2001). Complexity science: Coping with complexity: Educating for capability. *British Medical Journal*, 323:7316, 799-803.

Frese, M. (1995). Entrepreneurship in East Europe: A general model and empirical findings. In C.L. Cooper & D.M. Rousseau (Eds.), Trends in organizational behavior (Vol. 2, pp. 65–83). Chichester, U.K.: Wiley.

Frese, M. (1997). Dynamic self-reliance: An important concept for work. In: C. L. Cooper & S. E. Jackson (Eds.), *Creating tomorrow's organizations* (pp. 399–416). Chichester, England: Wiley.

Frese, M. (2009). Toward a psychology of entrepreneurship—an action theory perspective. *Foundations and Trends in Entrepreneurship*, 5, 435–494.

Frese, M., D. Fay, T. Hilburger, K, Leng & A. Tag (1997). The concept of personal initiative: Operationalization, reliability and validity in two german samples. *Journal of Occupational and Organizational Psychology*, 70, 139–161.

Frese, M., W. Kring, A. Soose, & J. Zempel (1996). Personal initiative at work: Differences between East and West Germany. *Academy of Management Journal*, 39, 37–63.

Gambetta, D. & C. Badcock (1990). Trust: Making and Breaking Cooperative Relations. *The British Journal of Sociology*, 41:1, 128.

García-Álvarez, E., & J. López-Sintas (2001). A Taxonomy of Founders Based on Values: The Root of Family Business Heterogeneity. *Family Business Review*, 14:3, 209–230. https://doi.org/10.1111/j.1741-6248.2001.00209.x.

Gartner W.B. & S.A. Shane (1995). Measuring entrepreneurship over time. *Journal of Business Venturing,* 10:4, 283-301.

Gedeon, S.A. (2017). Measuring student transformation in entrepreneurship education programs. *Education Research International*. vol. 2017, pp. 1-12. https://doi.org/10.1155/2017/8475460.

Gold, J., R. Thorpe & A. Mumford. (2010). *Gower Handbook of Leadership and Management Development.* 5th Ed. Farnham, Surrey, GBR: Ashgate Publishing Group.

Goldsmith, M. (2010), Leaders Make Values Visible [online], [cited 25 October 2019]. Available from World Wide Web: <URL: https://www.marshallgoldsmith.com/articles/leaders-make-values-visible/>.

Goldstein, I.L. (1992). *Training in Organizations: Need Assessment, Development, and Evaluation*. 3rd Ed. Pacific Grove, CA: Brooks/Cole.

Goleman, D. (1998). *Working with emotional intelligence.* London: Bloomsbury. 383p.

Goleman, D. (2000). Leadership that gets results. *Harvard Business Review*. 78 (March-April),82-83.

Goleman, D., R. Boyatzis & A. Mekee (2002). *Primal Leadership: Realizing the Power of Emotional Intelligence*, Boston, Harvard Business School Press.

Gras, D. & K.I. Mendoza-Abarca (2014). Risky business? The survival implications of exploiting commercial opportunities by nonprofits. *Journal of Business Venturing*, 29, 392-404. doi: 10.1016/j.jbusvent.2013.05.003.

Griffin, D., & L. Ross (1991). Subjective construal, social inference, and human misunderstanding. In: M. Zanna (Eds.), *Advances in experimental social psychology.* vol. 24, pp.319–356. NY: Academic Press.

Groumpos, P. (2017). *Creativity in Intelligent Technologies and Data Science: Second Conference.* In: CIT&DS 2017, Volgograd, Russia. Eds: Alla Kravets, Maxim Shcherbakov, Marina Kultsova, Peter Groumpos. New York: Springer.

Hamilton, G.G. (1978). The structural sources of adventurism. *American Journal of Sociology* 83, 1466-1480.

Hardy, A.P. (1982). The selection of channels when seeking information: Cost/benefit vs least-effort. *Information Processing & Management* 18:6, 289-293.

Hase, S. & L. Davis (1999). Developing capable employees: The work activity briefing, *Journal of Workplace Learning*, 8, 35–42.

Heidenheimer, A.J., H. Heclo & C.T. Adams (1983). *Comparative Public Policy: The Politics of Social Choice in Europe and America.* 2nd Ed. New York: St. Martin's Press. 367 p.

Henry, C., F. Hill, & C. Leitch (2003). *Entrepreneurship Education and Training: The Issue of Effectiveness*. London: Ashgate Publishing Ltd.

Hersey, P., & K.H. Blanchard (1988). *Management of organization behavior: utilizing human resources.* 5th Ed. Englewood Cliffs, NJ: Prentice-Hall.

Hitlin, S. (2003). Values as the core of personal identity: drawing links between two theories of self. *Social Psychology Quarterly* 66:2, 118–37.

Hogan J., R. Hogan & C. M. Busch (1984). How to Measure Service Orientation. *Journal of Applied Psychology*, 69:1, 167-173.

Homburg, C., W. Hoyer & M. Fassnacht (2002). Service orientation of a retailer's business strategy: dimensions, antecedents, and performance outcomes. *Journal of Marketing*, 66:4, 86-101.

Hunsaker, P. L. (2005). *Management: a skills approach*. 2nd Ed. New Jersey: Pearson Education, Inc.

Illiash, I. (2013). *Constructing An Integrated Model Of Public-Sector Leadership Competencies: An Exploration*. PhD Dissertaion. Graduate School-Newark Rutgers, The State University of New Jersey. Newmark, New Jersey.

Imran, F. (2014). *Analysis of Competencies of Sales Personnel of Banking Sector in Pakistan.* Master of Science Thesis, University of Vaasa, Finland.

Johnson, D. W., G. Maruyama, R. Johnson, D. Nelson & L. Skon (1981). Effects of cooperative, competitive, and individualistic goal structures on achievement: A meta-analysis. *Psychological Bulletin*, 89:1, 47-62.

Johnson, D. W., R. Johnson & G. Maruyama (1983). Interdependence and interpersonal attraction among heterogeneous and homogeneous individuals: A theoretical formulation and a meta-analysis of the research. *Review of Educational Research*, 53, 5-54.

Jussila J. (2007). *Innovation Competence.* Master's Thesis, Tampere University of Technology, Finland.

Kanter, R.M. (1983). *The Change Masters*. New York: Simon & Schuster.

Kantola, J., H. Vanharanta & W. Karwowski (2006). The Evolute system: a co-evolutionary human resource development methodolody. *International Encyclopedia of Ergonomics and Human Factors*, 2nd ed., CRC, Boca Raton.

Katz, R. L. (1955). Skills of an Effective Administrator. *Harvard Business Review*, 33, 33-42.

Kirkpatrick, S.A., E.A. Locke (1991). Leadership: Do traits matter? Academy of Management Executive. 5:2.

Kirzner, I.M. (1997). Entrepreneurial discovery and the competitive market process: an Austrian approach. *J Econ Lit*, 35, 60–85.

Klemp, G. O. (1980). *Assessment of Occupational Competence.* Washington DC: National Institute of Education.

Koellinger, P. & M. Minniti (2006). Not for Lack of Trying: American Entrepreneurship in Black and White. *Small Business Economics* 27, 59–79.

Kohli, A. & B. Jaworski (1990). Market orientation: the construct, research propositions, and managerial implications. *Journal of Marketing*, 54, April, 1-18.

Kotter, J. P., (2001). What leaders really do? *Harvard Business Review*, 79:11, 85-96.

Kouzes, J. M. & B.Z. Posner (1987). *The Leadership Challenge: How to Get Extraordinary Things Done in Organizations*. 1st Ed. San Francisco, CA: Jossey-Bass.

Ledeneva, A. (1998*). Russia's Economy of Favours: Blat, Networking and Informal Exchange.* Cambridge: Cambridge University Press.

Liao, J. & H. Welsch (2005). Roles of social capital in venture creation: Key dimensions

and research implications. *Journal of Small Business Management*, 43, 345–362.

Lytle, R.S., M. Lynn & S. Bobek (2000). Service orientation in transitional markets: does it matter? *European Journal of Marketing*, 34:3-4, 279-98.

Lytle, R.S., P. Hom & M.P. Mokwa (1998). SERV*OR: a managerial measure of organizational service orientation. *Journal of Retailing*, 74:4, 455-89.

Man, T.W.Y., T. Lau & K.F. Chan (2002). The competitiveness of small and medium enterprises. A conceptualization with focus on entrepreneurial competencies. *Journal of Business Venturing*, 17, 123-142. doi:10.1016/S0883-9026(00)00058-6.

Markman, G.D. & R.A. Baron (2003). Person-entrepreneurship fit: Why some people are more successful than others. *Human Resources Management Review*, 13, 281-301. doi:10.1016/S1053-4822(03)00018-4.

Maslow, A. H. (1968). *Toward a psychology of being*. New York: Van Nostrand.

Mason, R. O. & I.I. Mitroff (1981). *Challenging Strategic Planning Assumptions*. New York: Wiley

McClelland, D.C. (1961). *The Achieving Society*. Princeton, NJ: Van Nostrand.

McGraw-Hill. 283p.

Meek, W.R., D.F. Pacheco & J.C. York (2010). The impact of social norms on entrepreneurial action: evidence from the environmental entrepreneurship context. *Journal of Business Venturing* 25:5, 493–509.

Meunier-FitzHugh, K., & N.F. Piercy (2011). Exploring the Relationship between Market Orientation and Sales and Marketing Collaboration. *Journal of Personal Selling & Sales Management*, 31:3, 287–296.

Narayanan, L., S. Menon & P.E. Spector (1999). Stress in the workplace: A comparison of gender and occupations. *Journal of Organizational Behavior*, 20, 63–73.

Narver, J.C. & S.F. Slater (1990). The effect of a market orientation on business profitability. *Journal of Marketing*, 54, October, 20-35.

Nelson, T. (1996). Consciousness and metacognition. *American Psychologist*, 51, 102–129.

Newell, A. & H.A. Simon (1972). *Human problem solving*. Englewood Cliffs, NJ: Prentice-Hall.

Ngah, R. & Z. Salleh. (2015). Emotional Intelligence and Entrepreneurs' innovativeness towards Entrepreneurial Success: A Preliminary Study. Malaysian Academy of Entrepreneurship and SME Development, Faculty of Business Management, Universiti Teknologi MARA.

Oakeshott, M. (1962). *Rationalism in Politics: And Other Essays*, London: Methuen.

Ohmae, K. (1982). *The Mind of the Strategist: The Art of Japanese Business.* New York:

Palonen, E. (2005). *Tricuspoid - The Competencies Valuation Application for Entrepreneurship and Intrapreneurship*. Master's Thesis, Tampere University of Technology, Finland.

Peters, T.J. & N. Austin (1985). *A passion for excellence: the leadership difference*. New York: Warner Books. 575 p.

Philips, N. & P. Tracey (2007). Opportunity recognition, entrepreneurial capabilities and bricolage: Connecting institutional theory and entrepreneurship in strategic organization. *Strategic Organization*, 5, 313-320. doi:10.1177/1476127007079956.

Porter, M. (1985),Competitive Advantage: Creating and Sustaining Superior Performance. New York: Free Press.

Prince-Gibson, E. & S.H. Schwartz (1998). Value priorities and gender. *Social Psychology Quarterly*, 61:1, 49–67.

Rahim, M. A. & C. Psenicka (2005). Relationship between emotional intelligence and effectiveness of leader role: A dyadic study in four countries. *International Journal*

of Organizational Analysis, 13:4, 327-342.

Rauch, A., J. Wiklund, G.T. Lumpkin & M. Frese (2009). Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future. *Entrepreneurship: Theory & Practice* 33:3, 761–787.

Reynolds, P. (1997). Who Starts New Firms? Preliminary Explorations of Firms-in-Gestation. *Small Business Economics,* 9:5, 449-462.

Rezaei-Zadeh, M., M. Hogan, J. O'Reilly, B. Cleary & E. Murphy (2014). Using interactive managament to identify, rank and model entrepreneurial competencies as universities' entrepreneurship curricula. *Journal of Entrepreneurship*, 23, 57-94. doi:10.1177/0971355713513353.

Richards, D. & S. Engle (1986). After the vision: Suggestions to corporate visionaries and vision champions. In J. D. Adams (Ed.), *Transforming leadership*. Alexandria. Englewood cliffs, NJ: Prentive Hall.

Robbins, S.P. & T.A. Judge (2008). *Organizational Behavior.* New York: Pearson Prentice Hall. 716p.

Rokeach, M. (1973). *The nature of human values*. New York: Free Press.

Scheier M.F. & C.S. Carver (1992). Effects of optimism on psychological and physical well-being: Theoretical overview and empirical update. *Cognitive Therapy and*

Research 16:2, 201-228.

Schwartz, S. H. & W. Bilsky (1987). *The structure and importance of personal values in six societies*. Manuscript in preparation.

Schweiger, D. M., W.R. Sandberg & P.L. Rechner (1989). Experiential effects of dialecticalinquiry, devil's advocacy, and consensus approaches to strategic decision making. *Academy of Management Journal*, 32, 745–72.

Sedikides, C. (1993). Assessment, enhancement, and verification determinants of the self-evaluation process. *Journal of Personality and Social Psychology*, 65:2, 317-338.

Senge, P.M. (1990). *The fifth discipline: the art and practice of the learning organization.* New York: Currency Doubleday. 423 p.

Shafrir, U. & R. Kenett (2010). Conceptual thinking and metrology concepts. *Accreditation and Quality Assurance.* 15:585–590.

Shepherd D.A. & M. Haynie (2009). A measure of adaptive cognition for entrepreneurship research*, Entrepreneurship theory and practice,* 33: 695-714.

Shepherd, D. A., H. Patzelt & M. Haynie (2010). Entrepreneurial Spirals: Deviation-Amplifying Loops of an Entrepreneurial Mindset and Organizational Culture.

Entrepreneurship Theory and Practice, 34:1, 59–82.

Simon, H. A. (1967). Motivational and emotional controls of cognition. *Psychological Review* 74:1, 29-39.

Sine, W.D. & B. Lee (2009). Tilting at windmills? The environmental movement and the emergence of the US wind energy sector. *Administrative Science Quarterly* 54:1, 123–55.

Sprecher, T. B. (1959). A study of engineers' criteria for creativity. *Journal of Applied Psychology*, 43:2, 141-148.

Stephenson, J. (1994). Capability and Competence: Are they the same and does it matter?, *Capability*, 1:1, 3 – 4.

Tannenbaum, S.I. & G. Yukl (1992). Training and Development in Work Organizations. *Annual Review of Psychology*, 43, 399-441.

Thornton, P. H. (1999). The sociology of entrepreneurship. *Annual Review of Sociology*, 25:1, 19–46.

Tjosvold, D. (1988). Cooperative and Competitive Interdependence: Collaboration Between Departments To Serve Customers. *Group & Organization Studies*, 13:3,

274–289.

Tucker, S. & K. Cofsky (1994). Competency-Based Pay on a Banding Platform. *ACA Journal,* 3:1.

Tumasjan, A. & R. Braun (2012). In the eye of the beholder: How regulatory focus and self-efficacy interact in influencing opportunity recognition. *Journal of Business Venturing*, 27, 622-636. doi: 10.1016/j.jbusvent.2011.08.001.

University of Vaasa (2019). *Master of Science in Economics and Business Administration, Industrial Management (IM)* [online]. Vaasa: University of Vaasa [cited 20 October 2019]. Available from World Wide Web: <URL: https://www.univaasa.fi/fi/for/student/materials/handbooks/technology/master_of_science_in_economics_and_business_administration-industrial_management.pdf >.

Utsch, A. & A. Rauch (2000). Innovativeness and initiative as mediators between achievement orientation and venture performance. *European Journal of Work and Organisational Psychology*, 9:1, 45-62.

Utsch, A., A. Rauch, R. Rothfuss, & M. Frese (1999). Who becomes a small scale entrepreneur in a post-socialist environment: On the differences between entrepreneurs and managers in East Germany. *Journal of Small Business Management*, 37, 31–42.

Uy, M.A., M.D., Foo & Z. Song (2013). Joint effects of prior start-up experience and coping strategies on entrepreneurs' psychological well-being. *Journal of Business Venturing*, 28, 583–597.

Van Assen, M.F. (2000). Agile-based competence management: the relation between agile manufacturing and time-based competence management. *International Journal of Agile Management Systems*, 2:2, 142-155.

Vecchio, R.P. (2006). *Organizational Behavior: Core Concepts*. 6th Ed. Mason,OH: Thomson South-Western.

Weber, M., H. Gerth & C.W. Mills (1958). *From Max Weber: Essays in sociology*. New York: Oxford University Press.

Welter F. & D. Smallbone (2001). The Role of Government in SME Development in Transition Economies. *International Small Business Journal*, 19:4, 63–77.

Welter, F. & D. Smallbone (2006). Exploring the Role of Trust in Entrepreneurial Activity. *Entrepreneurship Theory and Practice*, 30:4, 465–475.

Wexley, K. & Latham (1991). *Developing and Training Human Resources in Organization*. New York: Harper Collins Publishers.

Williams, R.M. (1979). Change and stability in values and value systems: a sociological perspective. *Understanding Human Values: Individual and Societal* 1, 5–46.

Wright, D. (1971). *The Psychology of Moral Behaviour*. Harmondsworth: Penguin.

Yukl, G. (1989). Managerial Leadership: a review of theory and research. *Journal of Management*, 15:2, 251-290.

Zahra, S. & S. Nambisan (2012). Entrepreneurship and strategic thinking in business ecosystems. *Business Horizons.* 55.

Zahra, S. A., H.J. Sapienza & P. Davidsson (2006). Entrepreneurship and Dynamic Capabilities: A Review, Model and Research Agenda. *Journal of Management Studies*, 43:4, 917–955.

Zwell, M. (2000). *Creating a culture of competence*. New York: John Wiley & Sons. 344p.

APPENDICES

APPENDIX 1. Invitation Email

Dear university student,

I am a master's degree student at University of Vaasa. I am currently writing my master's thesis on "Analysis of Entrepreneurial Competencies of PhD Students of University of Vaasa". I chose University of Vaasa PhD students as a sample group to collect empirical data because of ease of access to students of University of Vaasa. My research aims to explore the competency level in entrepreneurship of University of Vaasa PhD students. Accordingly, I would be grateful if you would agree to participate in this research and respond to an online questionnaire consisting of 99 questions, where you will mark your current and target levels for each statement.

The user guide to use this online tool is attached with this email in the form of MS Power Point Presentation. Your contribution will be of great value to research and can be used to enhance the skills of entrepreneurial competencies of current or future students of University of Vaasa. Your identity will remain confidential throughout this study.

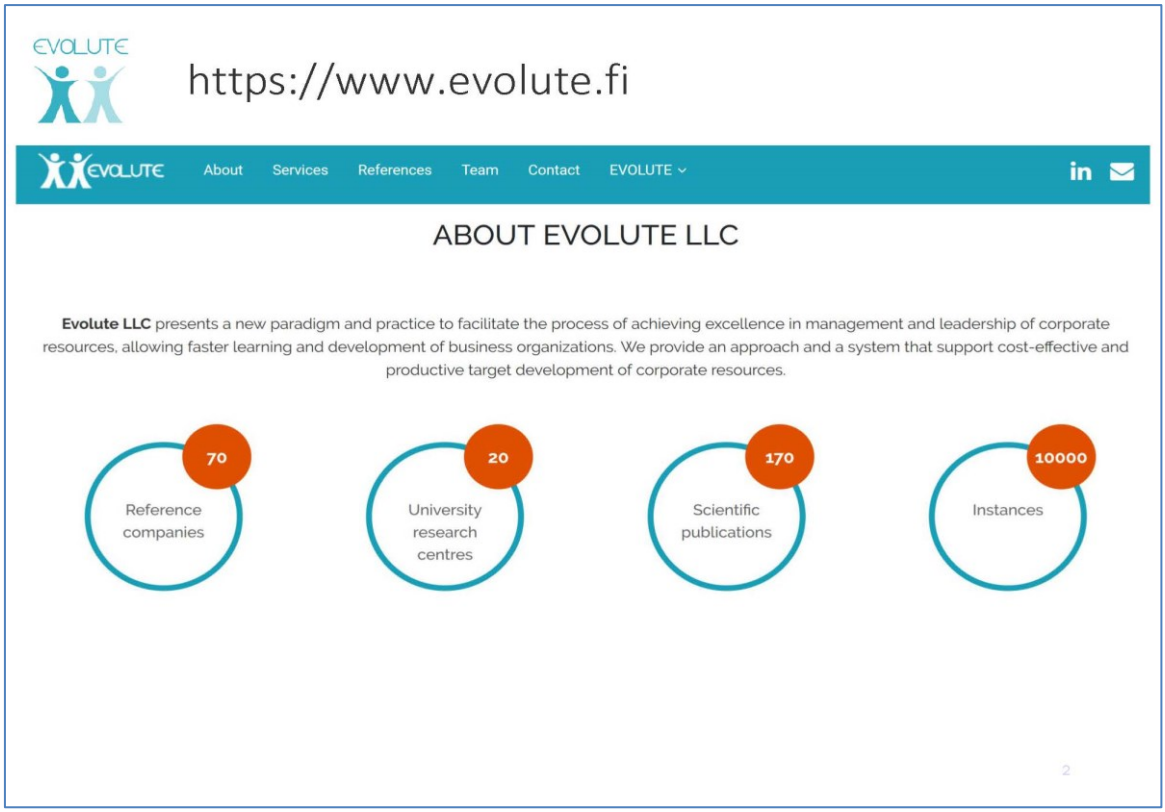
Best Regards,

Bülent Sahin

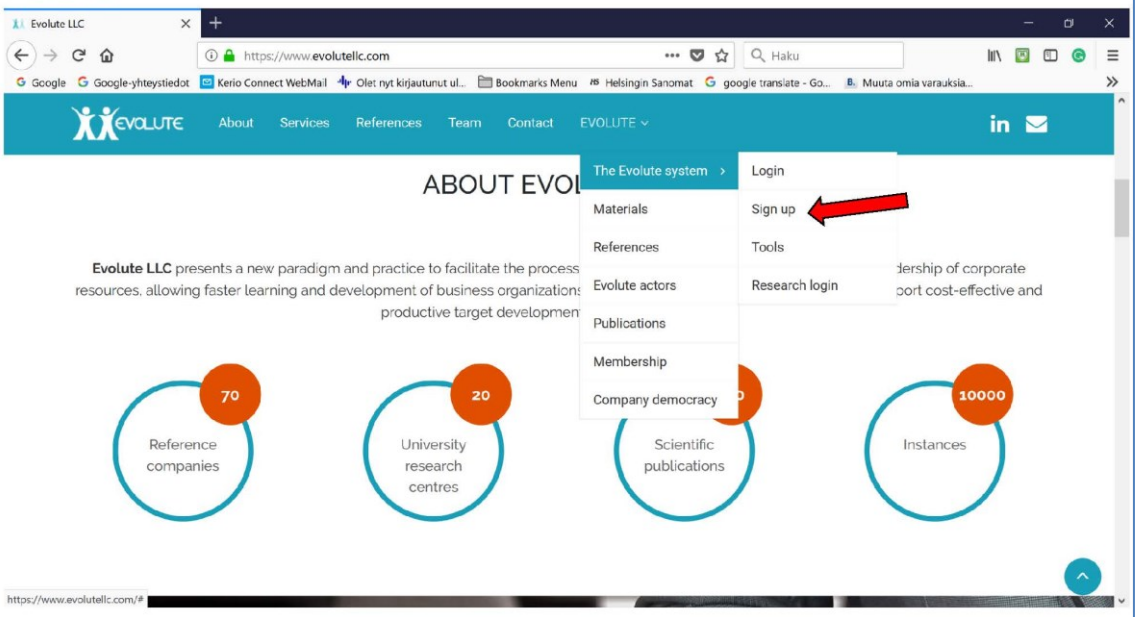
Master's degree student of

University of Vaasa, Finland

APPENDIX 2. User Guide for Tricuspoid 2.0



Sign up for Evolute



3

Further information

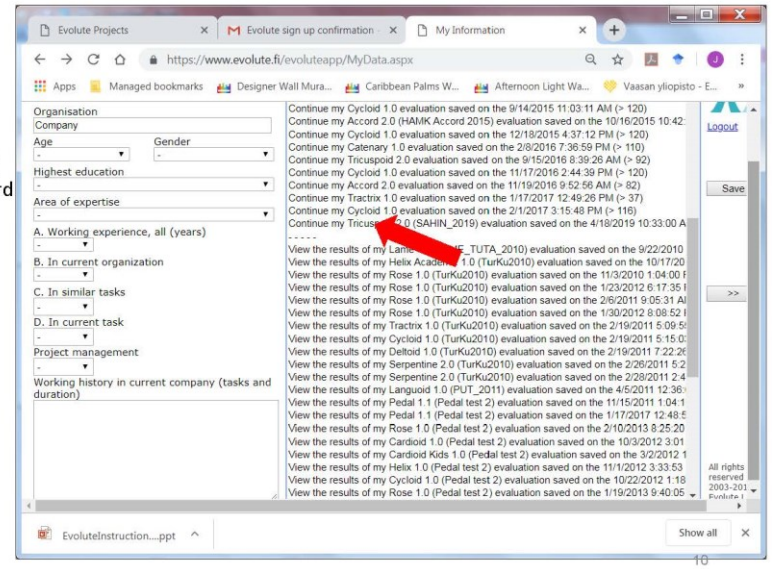
- You can go to the next statement by clicking >> button with your mouse or by pressing the space bar on your keyboard.
- Evaluation can be stopped and restarted later. If you take a long break, Evolute will automatically log you off. All answers are stored automatically and you can continue as mentioned in page 10.
- After the last statement it may take up to 1 minute to get your personal summary. **Do not** close your browser before the summary is generated.

11

EVOLUTE

Continue

- If you take a long break while answering or want to continue your evaluation some other time you need to login again.
- Login with your **username**, **password** and **Evocode**
- Choose your stored Tricuspoid 2.0 evaluation and click forward

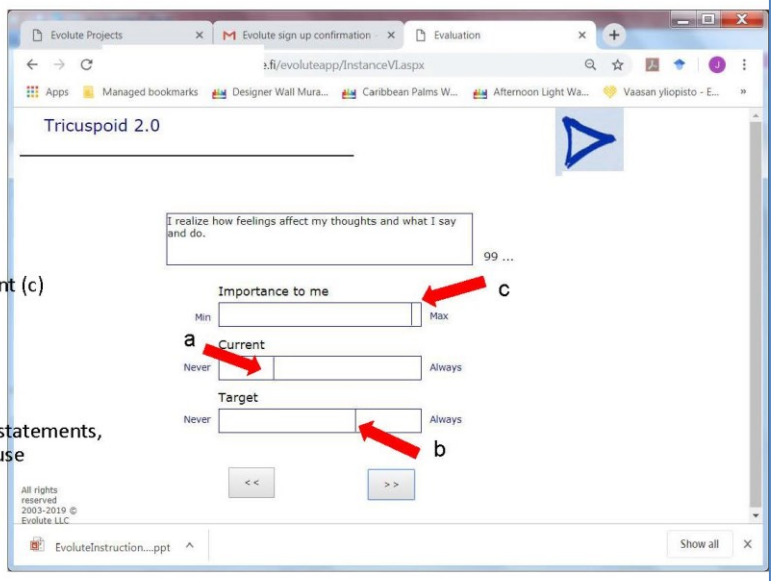


10

EVOLUTE

Statements

- Define your current state (a)
- Define your target state (b)
- Define the importance of statement (c)
- Click forward >> or space bar
- Your answers are stored after ten statements, which may cause a short delay in use



9

EVOLUTE

Start new evaluation

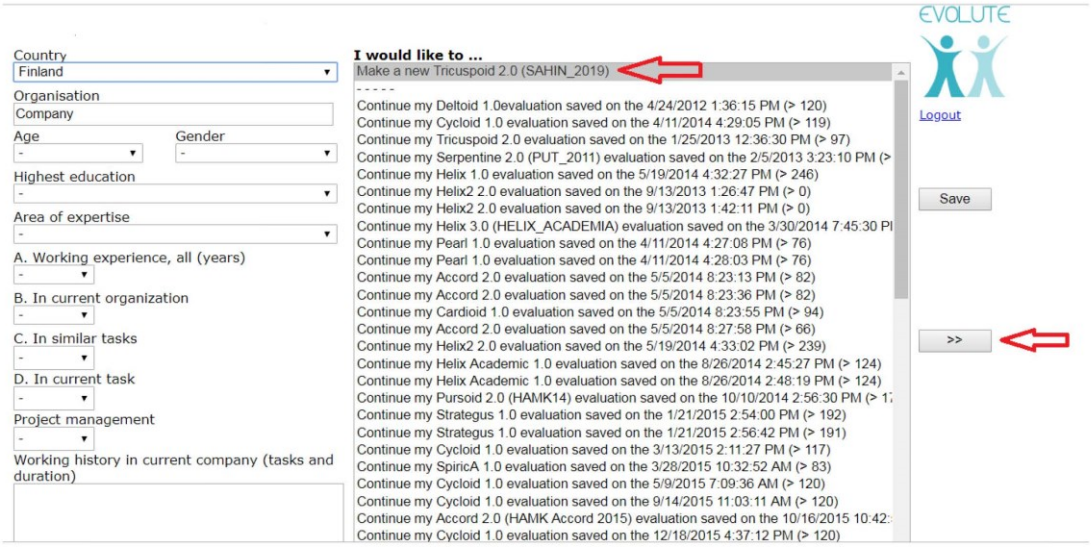
- Click >>

8

EVOLUTE

User information

- Fill in your information and click forward



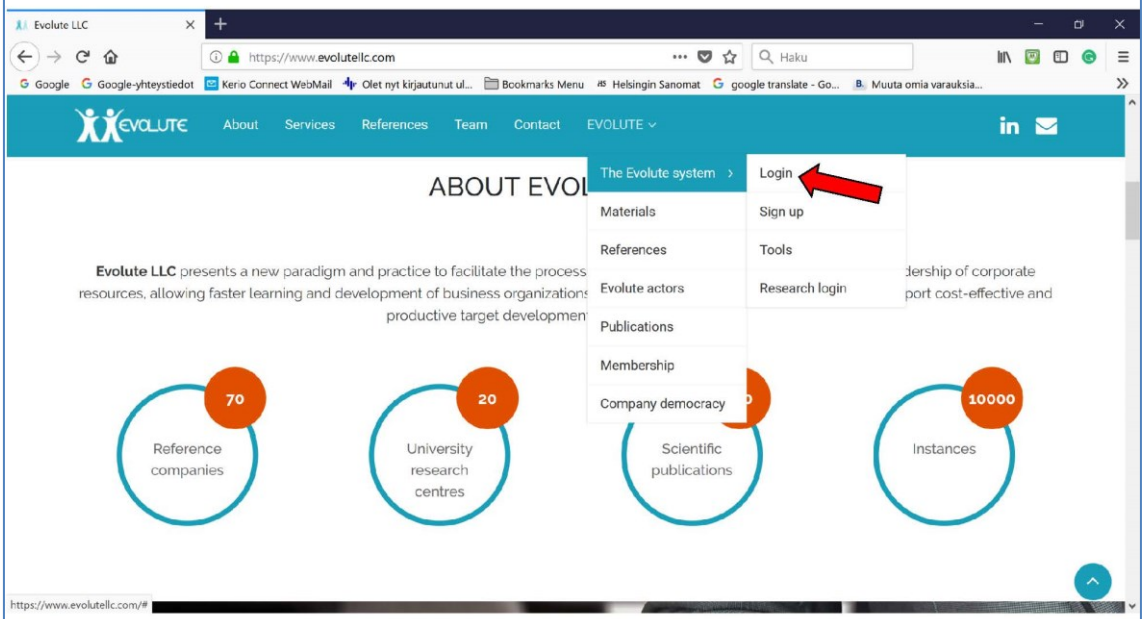
7

Login

- https://www.evolute.fi/evoluteapp/login.aspx
- Choose English language
- Enter your user id (email address), password and Evocode
- Evocode: TRIUVA2019
- Click forward

6

Login



5

Sign up for Evolute

- Fill in your details and click to **continue**

4

https://www.evolute.fi

Thank you!

12

APPENDIX 3. Pre-Formulated Questions of Tricuspoid 2.0

1. I realize how feelings affect my thoughts and what I say and do.
2. I put forward my views for the right cause and I stand by my words despite (regardless) the opinions of others.
3. I am open to new ideas, approaches and data (information).
4. I believe in achieving my goals despite obstacles and setbacks.
5. I recognize my own feelings.
6. It is difficult for me to defend my own opinion when other people disagree.
7. I can keep secrets to myself.
8. I like to solve the problems that I encounter in new and unique ways.
9. It is difficult for me to come up with new ideas.
10. I am curious and I collect information from my environment that could be of use in the future.
11. I solve problems intuitively, without too much analyzing or reasoning.
12. I use 'rules of thumb' or common sense to solve problems.
13. I read articles related to my field to improve my professional knowledge.
14. I also expand my professional knowledge outside my immediate (scope) field of work .
15. I develop my working methods to improve my performance.
16. When performing a task I always do my best to guarantee as good a result as possible.
17. I find it hard to interpret other people's feelings if they are not expressed directly and clearly.
18. I believe that people want to learn new things.
19. When (aiming to fulfil) I fulfill a client's needs I am ready to do more than is expected of me.
20. I leave inquiries or complaints made by clients without giving them much attention.
21. I try to reach solutions where everyone wins.
22. I encourage others to discuss matters openly in order to find a solution.
23. I treat group members impartially and fairly.

24. Through my own actions I try to keep up opportunities for co-operation which I have noticed.
25. I am familiar with my strengths and weaknesses.
26. I analyze my actions and learn from my experiences.
27. I am satisfied with uncertain or vague answers.
28. I actively develop different kinds of solutions to problems.
29. I rather face problems and attempt to solve them rather than avoid them.
30. I let time take care of problems.
31. The level of my performance weakens when I work under pressure or when stressed.
32. I would rather complete a task myself than delegate it to somebody else.
33. I try to work alone as much as possible.
34. I feel uncertain and I don´t believe in my own capabilities.
35. I keep my promises regarding what I have agreed.
36. I break my promises and agreements I have made.
37. Situations in my work sometimes arise where my professional expertise proves to be insufficient.
38. I willingly grab (seize) new opportunities and possibilities
39. I actively and attentively listen to other people's feelings (views).
40. I give frank feedback to other people concerning their personal weaknesses.
41. I stay (remain) calm and stable even in charged and difficult situations.
42. I am open to self-development.
43. I monitor achievements and compare them with the objectives.
44. I can come up with new ideas and viewpoints when needed.
45. I organize my tasks in a way that speeds up their accomplishment.
46. I act in a way as to (inspire and commit others) make other people enthusiastic and committed to the group's tasks.
47. I am indifferent to talking about my plans and knowledge with other people.
48. It is difficult for me to adjust to changes in my environment.
49. I am able to handle my stress without taking it out on my environment and thus harming others.
50. I recognize (and take into account) the organization's strengths and weaknesses in

developing organizational strategies.

51. I try (aim) to create a clear and inspirational vision for business operations.
52. I am able to recognize and evaluate the factors that have caused problems.
53. I prepare for anticipated problems by considering all the possible solutions.
54. I simplify complicated issues or situations by using common sense.
55. I create and use examples to explain complex concepts.
56. I let time take care of my tasks.
57. I help others to do things they have not done before and to learn and develop through (gained) experience.
58. When assigning tasks I provide all the necessary information.
59. The decisions I make are based on the goals, values and principles of the organization.
60. I make most of my decisions and take controlled risks at the right time, based on information I have gathered.
61. I am an initiator of changes.
62. I provide resources for change.
63. I know what my most important values are.
64. I find it easy to see things from the customers' point of view and I am a reliable advisor.
65. Things I value give direction to my actions.
66. I find reaching the goal more significant rather than the means of doing so.
67. Interesting issues waken curiosity and thirst for knowledge in me.
68. Time spent on a task is insignificant, if that task is filled.
69. I perceive the entirety and the goal that must be reached when preparing.
70. I don't look for demanding tasks and I find coping with routine tasks enough.
71. I will not take on a task I don't find manageable.
72. I act within permissable resources, not surpassing possibilities given by means available.
73. Making decisions is difficult when not being told what to do.
74. Strategic definitions of policy are important regarding resolute developing of operations.
75. I don't evaluate my own work performance but rather wait for external feedback

when necessary.

76. I wish to repeatedly perform task forcing me to strive to succeed.
77. I find myself performing too many routine jobs and routines.
78. In my opinion, tasks should be such that they are surely managed.
79. Excessive caution is often an obstacle for success.
80. One must take immediate action when perceiving a possibility for success.
81. Only tried and tested operational models are worth getting into.
82. It is satisfying to work on the edge of one's limits.
83. I sometimes lose track of time at work when concentrating thoroughly to my tasks.
84. I continuously use a substantial amount of my working input into learning new things.
85. I like testing new ideas even if it were safer to keep with tried working methods.
86. I often try to find new solutions to old problems.
87. I can act in a manner contradicting what I require from others
88. I recognize and evaluate factor for and against change.
89. I aim to analyze and correct my mistakes in order to improve my performance in the future.
90. My feelings are reflected in my behaviour.
91. I am able to change my working habits to meet public interest.
92. The tight schedules and unexpected problems irritate and anger me (and make me angry).
93. I develop new proper (suitable) working methods (for myself thus making my work more efficient) which make my work more effective.
94. I set goals (that are) linked to my work performance.
95. Man can find (There is) a solution for every problem.
96. When I run into misfortune I don't get depressed, instead I try again using new means.
97. I can easily interpret correctly other people's moods and reactions.
98. I act quickly and determinedly whenever opportunities and crises appear. (arise)
99. Complex and difficult tasks inspire me.

APPENDIX 4. INTERVIEW QUESTIONS

The following questions were asked in the interview with University of Vaasa Vice Dean regarding future plans of University of Vaasa towards PhD students:

- What is the state of competencies that PhD students of University of Vaasa for entrepreneurship? Do you think this is an important area to improve and what can be done to make them potential, successful entrepreneurs?

- What are the plans of University of Vaasa for PhD students to gain new competencies and improve the current competencies? (if any, which areas)

- What kind of efforts have been done till this day for PhD students to gain new skills or improve current skills? (if any, which areas)

- What areas of competencies should be focused most to improve in future?